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USSR Report

ENERGY

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USSR REPORT

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OFFSHORE OIL INDUSTRY INDUSTRIAL SUPPLY ALLOCATION REVIEWED

Moscow GAZOVAYA PROMYSHLENNOST' in Russian No 9, Sep 84 pp 36-38

[Article by V. N. Rozov of Mingazprom [Ministry of the Gas Industry], K. G. Khalilov of VBNIPImorneftegaz [All-Union Scientific Research and Planning Institute for Offshore Oil and Gas], and O. F. Karchenko of VNIIEgazprom [All-Union Scientific Research Institute on the Economics and Organization of Production and on Technical and Economic Research in the Gas Industry]: "Perfecting the Rationing of Industrial Supplies of Material Resources" under the heading: "Exploitation of the Shelf"]

[Text] / The broad search for, and exploitation of, oil and gas deposits on the continental shelf of our country involves the consumption and utilization of material and technical resources of several tens of thousands of kinds. In a number of the most important directions for increasing the efficiency of their use, there are problems connected with the determination and evaluation of the socially necessary level of industrial supplies./ [Slant lines indicate text printed in boldface in source]

The problem of rationing industrial supplies of material resources is the determination of the socially necessary level of them which will assure an economically well-grounded continuity of the production process. The solution of this problem involves the development and continuous improvement of scientific methods of rationing industrial supplies which supplementarily permit bringing substantial material resources into the national economic turnover. An acceleration of the rate of turnover of supplies of commodity and material values for only one day, according to Glavmorneftegaz [Main Administration for Offshore Oil and Gas], makes possible a supplementary drawing into the national economic turnover of about 440 tons of oil piping, 376 tons of all kinds of cement, 687 tons of chemical materials, and so on.

To substantiate the socially necessary dimensions of the accumulation and the level of the rate of turnover of industrial supplies of material resources in special cases requires reexamination and further improvement of the traditional methods of rationing and controlling industrial stocks. High dynamism, regional dispersion, the particular self-sufficiency of enterprises, the cyclicality and discreteness of demand and many other specific factors affecting rationing, make rigid demands on the sustantiation of the level of accumulation and the rate of turnover of industrial supplies in an area being considered (see illustration).

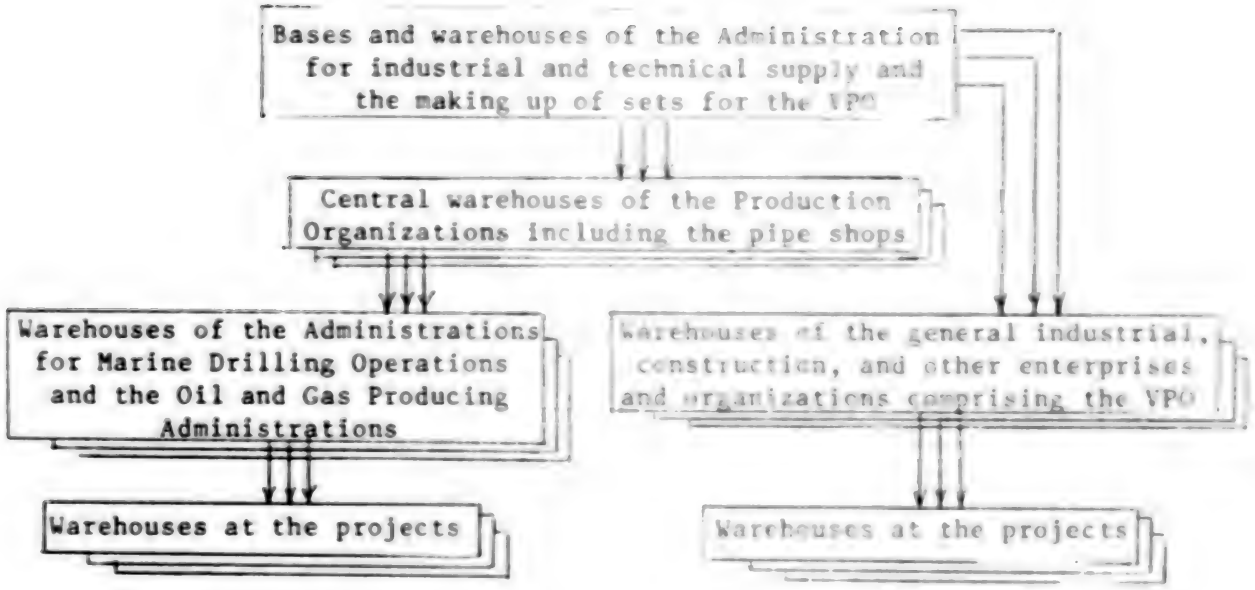

Diagram of the movement and storage of industrial supplies of materials according to management level in the All-Union Industrial Association [PVO] Glavmorneftegaz

A definitive work was carried out by Mingazprom on the calculation of rations of industrial supplies of raw matrials and materials for the associations (enterprises) of the industry using the Standard Method*. The experience of using it confirmed, on the whole, the soundness of the recommended methods of rationing industrial supplies. In the use of this method, however, for the conditions of the work of the associations (enterprises) for offshore oil and gas production, the necessity arose to take account of additional factors affecting the rationing level of industrial supplies.

In the first place, the Standard Method provides for the calculaton of the current and preparatory part of the ration of industrial supplies only from the bases and the warehouses of the USSR Gosnab [State Committee for Material and Technical Supply] system and from departmental supply and marketing organizations. Deliveries to Mingazprom supply and marketing organizations which are not included in the list of departmental organizations, are not taken into account in warehouse deliveries nor, correspondingly, is the current and preparatory part of the ration of supplies in warehouse deliveries of materials from the bases and warehouses of UPTuiK [possibly Administration for Material and technical Supply and the Making up of Sets] reject consumers.

* Standard Method of Rationing Industrial Supplies of Raw Materials and Materials in Industry Using a Computer, Moscow Izdatel'stvo NIIPiN [Scientific Research Institute for Planning and Rationing], 1979

This factor acquires tangible significance in the conditions of direct shipments of materials narrowly specialized to the industry (oil field grade piping, chemical reagents, plugging cement, and so on) when the organization of the shipments of these materials from the bases and warehouses of the USSR Gossnab system is unadvisable.

It seems that the size of rations of industrial supplies should be derived from direct rationing factors in the acting organizational structure of the administrations and managements of the industry. Without doubt, the taking away of supply and marketing organizations to one or another (departmental or extra departmental) system of activity will not change the content of the establishment and functioning of the activities of the commodity handling networks for the material and technical supply of the industry. Thus, the warehouse deliveries from the bases and warehouses of UPTOiK to the oil and gas producing sites and other facilities have to be taken into account by means of direct counting of specific discrete intervals of deliveries for all the commodity handling networks of the associations (enterprises) of Glavmorneftegazprom.

In the second place, the Standard Method takes into account the lying around of materials in stocks in accordance with the established character of their intake or demand without a sufficient substantiation of its amounts. The thing is, that in the experience of calculating rations of industrial supplies, with perfectly good reason, doubts arise in the substantiation of the amounts of materials which lie around from the moment of their arrival before their industrial consumption.

Management practice reveals two principle reasons causing the lying around of materials in stocks; namely, discord in the rhythm of the delivery and consumption of materials resulting from the limitations of delivery contracts (anticipatory deliveries), and the accumulation of materials of different kinds in assortments.

Of course, the lying around for the first reason cannot serve as a rationing factor; whereas,the second reason for lying around is without doubt a rationing factor of deep concern.

Inasmuch as the reasons for materials lying around in stocks are not differentiated by the Standard Method, the necessity arises in correcting the method, of calculating the current part of industrial supplies by means of a direct calculation of the mean weighted interval (period) of the lying around of materials for the making up of sets. This acquires special importance in the conditions of the consumption of oil field piping assortments. The variety of the assortment of pipes put together in the process of sinking a well (drill-pipe), of securing a well (casing pipes), of equipping a well with an oil raising lift (pump and compressor pipe), and equipping oil and gas deposits (petroleum carrying pipes) amounts to several hundred kinds (kinds of steel, different pipe diameters and wall thicknesses). So, for the Kaspmorneftegazprom [Caspian Sea Marine Oil and Gas Industry] for 1983, the actual annual surplus of casing pipe amounted, as a whole, to 147-days of consumption. The provision of the association with casing pipe, based on supplies as a whole,

amounted to 108.9 percent. At the same time, the provision of casing pipe in accordance with the specified (assortment) consumption in this same year amounted to only 83.9 percent which rather eloquently illustrates the reasons for the lying around and the formation of an above ration (+ 57 day) supply of casing pipe.

The established practice of loading pipe mills (the high setup norms) and the objective effort to reduce the technological readjustments of the mills causes the one-time deliveries of pipes of a specific assortment in large consignments over significant intervals (periods) of time. Therefore it seems advisable that calculation of the current part of a ration of industrial supplies, particularly for assortments of oil field pipes in the offshore sphere of activity, be carried out directly taking into account the time these materials lie about in anticipation of set saturation.

In the third place, the Standard Method has not provided for the calculation of the special preparatory part of a ration of industrial supplies, taking into account the preparation of an assortment of oil field pipe for use (the grooving of threads, hydraulic testing for strength, the washing and greasing of threads, and so on). The calculation of the time for the special preparttory part of a ration is accomplished based on the amount of pipe in an oil field assortment in one delivery and differentiated time norms for the special preparatory operations.

In the fourth place, the Standard Method, as already mentioned, artificially excludes calculation of the current and preparatory part of a ration of industrial supplies according to warehouse deliveries from the bases and warehouses of UPTOiK for the associations (enterprises) of Glavmorneftegaz. The necessity therefore arises for direct counting of the intervals (periods) of lying around of supplies of materials in their transshipment and delivery to an offshore oil producing site. Meanwhile, the delivery of the materials requires differentiation of the time for direct delivery to the site (the physical time of moving the loads) and the time (period) of interruption in the delivery of materials to offshore sites because of nydrometeorological limitations on the operation of sea transport (crane ships, supply ships).

The existing hydrometeorological limitations on the operation of maritime transport which have been established differentially for seas and oceans, cause discreteness in material and technical supply for offshore sites and encumber the organization of rhythmic and regular supply. The interruptions in providing material and technical resources arising from hydrometeorological conditions bring about the need of creating appropriate industrial reserves at offshore sites. For that part of the ration of industrial supplies, a quantity of material resources is adopted which must be on the offshore sites to assure uninterrupted production in the period between two successive deliveries.

In addition, a specified supply of materials is necessary at drilling sites as dictated by the Unified Technical Rules for the Conduct of Operations in the construction of wells at oil, gas, and gas condensate deposits. These rules require that a drilling installation, before beginning drilling, must

be fitted out with drill and casing pipes for the guide and the casing and also the first intermediate column (but not more than a month's consumption). In addition, the drilling site must be provided with the necessary supplies of plugging cement, chemical reagents, and other materials for the preparation of the drilling solution.

All this has made necessary the development of a method of rationing industrial supplies of material resources which take into account the specifics of the production activities of the associations (enterprises) of offshore oil production. The introduction of this method will provide a sufficiently high balance for production operations in the exploitation of the oil and gas resources of the continental shelf and its fitting out with the necessary material resources.

9136
CSO: 1822/124

OIL AND GAS

NEW GAS PIPELINE OUTPUT INDICATORS PROPOSED

Moscow GAZOVAYA PROMYSHLENNOST' in Russian No 9, Sep 84 pp 25-26

[Article by E. A. Mikaelyan and A. M. Nazarina of the MINKH i GP [Moscow Order of the Labor Red Banner Institute of the Petrochemical and Gas Industry imeni I. M. Gubkin]: "Indicators of the Modes of Operation of Gas Transport Systems"]

[Text]/ At present the basic indicator characterizing the operating condition of gas pipe lines is the loading coefficient (the ratio of the actual output to the designed or technically possible capability). Such an approach, however, does not permit visualizing a whole series of features of the operation of the existing systems of gas pipelines, especially it does not permit evaluating the dynamics of the changes of their output over time.

A system of indicators is proposed which will make it possible to fully take into account operational features connected with the degree of loading of gas pipelines./ [The passage between slant lines printed in boldface in source]

The development of a gas pipeline can be divided into three basic periods; namely, the growth of output, normal operation, and falling output. For purposes of monitoring and qualitative evaluation of the operation of a gas line during these periods, it is advisable to use the following indicators:

the characteristic, Et, the relative rate of change of the output of the gas pipeline which is determined as the ratio of the increase in output, Q' to its average output, Qsr for the period being considered. This characteristic evaluates the trends of the development of the system for the three periods being considered. In the period of growth its value always should be greater than 0 ($Et>0$), during normal loading, $Et=0$, and in the period of falling output, $Et<0$;

the characteristic, β_i, of the periodic oscillations of the output of the gas pipeline which is the relative amplitude of the harmonic component of the output of the gas line for the considered period;

the coefficient of loading of the gas pipeline, E, determined as the ratio of the actual output of the line to its designed output ($E = Q/Qpr$).

The operating conditions of three gas pipelines over a period of five years were studied on a computer. Comparison of the results obtained according to

the planned and actual data on the output of the gas pipelines showed that the planned operation of the gas transport systems over a year (by the month) were done without taking account of the improved technical and economic indicators. Thus, over the investigated period, the characteristic, β, of the periodic oscillations of the output of the second line changed from o.055 to 0.209 (deteriorated), but for the second [sic, first intended?] and third pipelines it changed from 0.09 to 0.04 and from 0.11 to 0.05; that is. it improved.

The characteristic determining the degree of development of the gas transport systems, according to output, is most favorable for the first pipeline. For this pipeline a steady increase of output was observed. In the first two years of the operation of the line the rate of monotonic growth of output amounted to 63 and 71 percent, and in the succeeding two years this characteristic was reduced to 4.5 and 2 percent which corresponded to the period of operation of a developed gas line.

The third gas pipeline in the initial period of operation was distinguished by substantial rates of development and the indicator characterizing the rate of growth of output amounted to 142 percent. Then the operation of the line stabilized and its periodic oscillations in output amounted to 0.05.

For the second gas pipeline, in the course of three years, ouput steadily fell and then a sharp increase of output was observed (approximately 100 percent). The pipeline was characterized by steadily alternating rates of increase and reduction of output. While in the first year its output increased on the average by 8 percent, in the succeeding two years it was reduced by 4.5 and 62 percent respectively, then it increased by 20 percent, and in the fifth year of operaton it again was reduced by 18 percent. This line in the first two years increased loading and the coefficient E was equal to 0.87 and 0.94 respectively. Then because of the development of a neighboring system, the loading was reduced from 0.69 to 0.30.

Values of the actual coefficients of loading, E_ϕ, and the designed ones, E_p, obtained as a function of β, are presented in Table 1. It should be mentioned that in a number of cases, not only periodic oscillations, but other factors not permitting full utilization of the throughput capacity of the gas pipeline had an effect on the loading.

If a number of operational factors leading to a reduction of the loading of the gas pipelines are excluded, then the difference between E_ϕ and E_p will determine the degree of obstruction of the lines and, according to that, the time for cleaning and maintenance of the lines can be determined approximately.

Over the investigated period, in the first two years, the gas pipelines were subjected to insignificant oscillations of output except for the first line. The characteristic of the periodic oscillations of output of this gas pipeline then reached magnitudes of approximately 0.26 and in the remaining years did not exceed 0.043.

Table 1. Actual and Designed Values of the Loading Coefficient of Gas Pipelines

(1) Год работы	Газопровод (2)					
	первый (3)		второй (4)		третий (5)	
	$E_ф$	$E_р$	$E_ф$	$E_г$	$E_ф$	$E_р$
1	0,94	0,97	0,87	0,92	—	—
2	0,96	0,96	0,94	0,99	—	—
3	0,62	0,80	0,69	0,92	—	—
4	0,95	0,97	0,26	0,92	0,58	0,99
5	0,96	0,97	0,30	0,90	0,84	0,93

key: (1) year of operation
(2) gas pipeline
(3) first
(4) second
(5) third

Table 2. The Influence of Periodic Oscillations in the Output of Gas Pipelines on the Technical & Economic Indicator KC

(1) Характеристика переменного режима газопровода β	(2) Средний коэффициент загрузки энергопровода КС	(3) Относительное изменение приведенных затрат
0,25	0,64	0
0,20	0,71	0,15
0,15	0,78	0,28
0,10	0,85	0,38
0,05	0,94	0,50

key: (1) The characteristic, β, of the variable mode of operation of the line.
(2) Average loading coefficient, KC, of the power drive.
(3) Relative change of direct expenditures.

The periodic oscillations in output of a gas line have an effect on the loading coefficient, KC,of the pipeline power drive. The connection between these indicators is characterized by the data in Table 2 from which it follows that a lowering of the characteristic, β. , corresponds to an increase in the loading coefficient of the pumping units, which, in turn, produces increased demands on the operation of the pumping units, and on the reliability of all their parts, and leads to a reduction of the periods for planned repairs and to an increase of the time between repairs. The noted tendency toward lowering the characteristic, β , of working gas pipelines also can lead to a reduction of direct costs. Thus, with a reduction of β from 0.25 to 0.10 can bring about a 35 percent reduction in direct costs.

Table 3. The Effect of Periodic Oscillations of Gas Pipeline Output on the Technical and Economic Indicators of Main Trunk Line Gas Transport

(1) Характеристика переменного режима газопровода β	Снижение удельных капитальных вложений (2)		
	(3) руб/тыс. м³	(4) руб/(млн. м³·км)	%
0,30	6,2	0,073	23,2
0,25	5,4	0,063	20,1
0,20	4,5	0,053	16,8
0,15	3,5	0,042	13,3
0,10	2,5	0,029	9,3
0,05	1,3	0,015	4,8

Key: (1) The characteristic, of the variable mode of operation of the pipeline
(2) The reduction of the specific capital investments
(3) Rubles per thousand cubic meters
(4) Rubles per million cubic meters per kilometer

It should be noted that periodic oscillations of gas pipeline output also influence the capital, direct and operational expenditures for the whole gas transport system. The output of a gas pipeline, Q, is connected with the amount of investment in the main trunk line transport of gas by the relation:

$$K = K_0 Q, \qquad (1)$$

where Ko is the specific capital investment in the main trunk line transport of gas in rubles per thousand cubic meters per kilometer.

The relation between the characteristic β and the capital investments has the form:

$$K = K_0 Q_{max}^{n} = K_0 Q_{cp}(1+\beta) = f(\beta), \qquad (2)$$

whence:

$$K_0 = \frac{K}{Q_{cp}(1+\beta)}.$$

With an established amount of capital investments for a period being investigated, the planned volume of gas transported, Q^{n}_{max}, can be substantially increased by a smoothing out of the periodic oscillations of output; that is, by a lowering of β. In so doing, conditions are created for improving the qualitative indicators of the efficiency of the whole gas transport system, for increasing the coefficient of utilization of the installed capacity, and for increasing the loading of the GPA [Gazovaya Provoda ? Gas Pipeline] (see Table 3). The reduction of periodic oscillations in the output of gas pipelines also leads to reducing the capital investments in main gas trunk lines.

The use of the obtained relationships can establish the influence of the mode of operation of a gas line on other economic indicators including the cost of the transported gas.

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OIL AND GAS

DETAILS OF GAS PRODUCING COMPLEX CONSTRUCTION DESCRIBED

Moscow GAZOVAYA PROMYSHLENNOST' in Russian No 9, Sep 84 pp 6-7

[Article: "The Shock Front of an Auxiliary Contractor"]

[Text] The completion of the construction and installation work on the startup complex and the facilities for fitting out the Astrakhan gas field and gas processing plant will cost 1.1 billion rubies according to YuzhNIIgiprogaz [The State Southern Scientific Research and Planning Institute for Gas]. More than two thirds of this work is to be done by subdivisions of USSR Minpromstroy [Ministry of Industrial Construction]. Guram Militonovich Vachnadze, chief of one of the subdivisions, the VO Soyuzspetspromstroy [All-Union Construction and Installation Association for Industrial Construction] tells how its work was organized.

By a decision of USSR Minpromstroy, the construction of the gas procesing plant and the production base for the construction and installation organizations and the client in the region of the Volga Railroad's Aksaraysk-1 station and the village of Kiri-Kili, has been entrusted to VO Soyuzspetspromstroy, but the facilities for dwelling and civilian purposes in Astrakhan are entrusted to the main administration for regional construction - Glavastrakhan'-stroy.

The time lost in the organizational period of such large projects has been held to a minimum and this has created the conditions necessary for fulfilling the plan for the construction and installation work.

According to YuzhNIIgiprogaz, it is estimated that the construction of the production base and the facilities for the first phase of the complex requires the completion of about 13 million cubic meters of excavation work, the laying of more than 600,000 cubic meters of concrete, and the installation of about 350,000 cubic meters of prefabricated reinforced concrete structures and 50,000 tons of metal structures.

In the course of the construction special attention has been given to the questions of realizing modern technical proposals in the design stages and also to the perfection of the structural production. For the solution of

complex engineering problems, the scientific research and planning institutes of Minpromstroy assisted the general designer. The high level of prefabrication of buildings and structures, the wide application of traditional light metal structures, of short driven piles and of silicatization in laying the foundations of buildings and structures, the use of the method of "a wall in the ground" in the installation of the seasonal regulating tank, the use of load lifting machines and other construction machines of increased unit power - all these things permitted the association to go into a high rate of production. While in 1982, the association assimilated 35 million rubles worth of work, and 83 million in 1983, in the current year, the association will assimilate up to 121 million rubles.

It cannot be said that the journey from boundary to boundary is causing delay. Serious interruptions in the work occur, for example, because of untimely delivery of sets of equipment or because of shortages of qualified engineers and constructors. In such cases we have to take extreme measures to solve the problem, even at high level.

At present on the sites of the first phase, the association has practically completed the excavation work, has laid 350,000 cubic meters of ready-mixed concrete, and has erected about 400,000 cubic meters of prefabricated reinforced concrete and 56,000 tons of metal structures.

Taking into account the duration of the planning and construction of the principal base in the village of Kiri-Kili, the erection of the facilitites of the complex throughout is being accomplished based on coordinated deliveries of prefabricated reinforced concrete from the republic ministries and the regional subdivisions of USSR Minpromstroy.

Dwellings for the operating personnel of the GPZ [Gas Processing Plant] are being built in Astrakhan. For the period of the bulding of the plant, three residential zones (villages) have been introduced in which the 10,000 persons who are participating in the construction have been accommodated. In connection with technical difficulties in the expansion of the villages which have been built and with the unsatisfactory rates of dwelling construction by the limited capabilities of the Astrakhan house constructing combine, a first priority problem confronts the association of creating in the village of Kiri-Kili a plant for large-panel house construction having a capacity of 140,000 square meters of dwellings. It will be placed in operation in 1985.

Soyuzspetspromstroy has done important work in the building of a base for workers supplies in Aksaraysk. In it are: a 2,000 ton capacity refrigerator, a 2,000 ton vegetable storage, a bakery for 10 tons of bread a day, a fermenting and salting shop, a shop for nonalcoholic beverages, stores, and a dining hall with 4,000 seats. In the current year we are expanding the facilities for commerce and living.

Not much time remains before the startup of the complex. The preparations for operation are being concluded. The construction is entering to the phase when all attention is transferred to the engineering facilities, the oil field and the gas processing plant area. The collectives of the construction

and installation organizations are fully resolved to place the complex into operation at the established time. Much will depend on the coordination of the activities of the client, the general contractor, and the installation organizations in which each of them is interested.

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OIL AND GAS

LARGE NEW NATURAL GAS PRODUCING CENTER IN ASTRAKHAN

Moscow GAZOVAYA PROMYSHLENNOST' in Russian No 9, Sep 84 pp 2-5

[Article: "A new Industrial Center on the Volga"; Passages between slant lines printed in boldface in source]

> [Text] The future of the gas industry is strongly connected with an increase in the volume of the processing of natural gas and the necessity for efficient use of natural resources. The complex approach to the solution of the problem of the assimilation of the gas condensate deposits of the Caspian region lowlands is convincing confirmation of this.
>
> The editorial staff offers to the readers the report of the general director of the PO [Production Association] Astrakhan'gazprom, Mikhail Nikolayevich Radchenko, which is accompanied by statements from participants in the construction of the AGK [Astrakhan Gas Complex] and our commentary.

The construction of the first phase of the Astrakhan Gas Complex has been going on for two and one half years already. It is made up of facilities for industrial purposes, the gas-condensate oil field, a gas processing plant, a main gas pipeline, product pipelines from the gas processing plant to consumers, production wells, and so on.

The majority of the facilities are situated in the semidesert zone of Astrakhan on the left bank of the Volga. Here, the prolonged summer is frequently very hot - the summertime air temperature is 50 C - and in the short but severe winter, the cold reaches -30 C. Strong winds, which change into dust storms or snow storms, blow only two months of the year. Also complicated are the geological conditions of the site of the gas condensate strata which, at four-kilometer depths which contain large volumes of hydrogen sulfide. Additional difficulties are the absence in the Astrakhan oblast of construction materials - gravel, crushed stone, and sand - and also an absence of a developed network of construction industries. Therefore, basically, light, quickly installed buildings of metal construction, box units, of high plant readiness have been set down in the design solutions.

The ecological features of the oblast present the most rigid requirements for the technology of the construction and operation of the AGK. The nearness of a unique reservation situated at the delta of the Volga and Akhtub rivers was taken into account to begin with by a design for production without waste products and by raising the pipe lines over the water barriers. Already in the first stages of the construction of the Astrakhan industrial center, the classical construction scheme has been used; namely, to begin with the automotive access roads, railroads, and electrical transmission lines were laid, residential settlements together with facilities for municipal and domestic services were built, and then they set about the construction of environmental protection facilities. A whole division on gas safety is provided in the program for the formation of the industrial center. It includes creating automated monitoring of pollution of the ground layer of the atmosphere, of industrial areas and populated points, forming a specialized counterprotective [? sic] service, and a number of other measures.

/V. Serov, the chief of the laboratory for environmental protection of the PO Astrakhan'gazprom, tells about the measures which permit bringing the influence of the technological processes on nature and people down to a minimum.

From the start up of the plant, the analysis and venting of wells is required to be done through specially constructed vessels with delivery of the products to the plant. Four installations have been designed for the tertiary treatment of waste gases - smoke pipes which can provide for the dispersion of discharges and concentrations of polluting substances at ground level in quantities not exceeding the allowable norms. The waste cleaning structures of the plant, together with the vessel for seasonal regulation and with agricultural field irrigation should provide for a guaranteed purification of the production wastes.

A range for the injection of industrial wastes into the formation, protective tree plantings, an installation for the burning of industrial wastes, a system for monitoring atmospheric pollution, and a whole series of facilities of the complex with a total cost of more than 100 million rubles should provide protection for the environment, with the condition, that all these facilities will be built well and within the projected period.

At the present time, with the participation of bodies of the sanitary service, standards have been developed for the quality of buried drilling solutions that prevent polluting the soil. Monitoring of the condition of atmospheric air on the territory of the deposits has been laid on and has been carried out regularly since 1982. This makes it possible to judge the degree of concentration of polluting substances, and - what is very important - to develop measures for preventing the infection of the atomsphere with production wastes./

The compressed deadlines for construction and the huge capital investments which all must be assimilated at a practically empty site characterize the unprecedented rate of development of the gas industry. Basically, the assigned rates of construction are being maintained. The construction equip-

ment and the organizations of five general contractors have been concentrated at the construction sites. The work is organized on a two shift basis, and in the individual organizations , according to the watch method.

The progressive methods of construction are more and more widely being used in the building; namely, the brigade contract, enlarged-unit or block installation, production-line work organization and a series of other forms of collective work.

While in the past year the temporary dwellings, the first priority facilities of the production base for the constructors, the motor vehicle roads, railways, warehouses, and a number of other auxiliary parts were built, in this year, the rate of construction has been increased twofold, and that is not the limit - during the next two years, the volume of construction and installation work will be tripled.

/ There are many examples of the accelerated building of the auxiliary and production facilities of the AGK. Seen as an example of this, as the social domain of the participants in the construction is being precipitously transformed, is the village of Aksaraysk, near which the principle production facilities of the complex are being built.

The chairman of the executive committee of the Aksaraysk village council of peoples' deputies, A. I. Aleshin tells about it.

"Over two years the population of our industrial center grew by a factor of 15. During this time, comfortable family dwellings, bachelor boarding houses, a commercial complex, a hotel, and an apartment house were built. Scores of kilometers of electrical power lines, cable communications and water pipes were laid. Soon there will be our own stadium and a boat landing." /

Mingazprom [The Ministry of the Gas Industry] constantly pays attention to the building of the facilities of the Astrakhan industrial center. Special importance is given to the solution of the urgent problems of construction and to perfecting the structure of the administration of the PO Astrakhan'gazprom.

At present there are 17 subdivisions in the association, including the board of the gas-field administration, the board of the gas-processing plant being constructed, two administrations for drilling operations, the production line administration for the main gas pipeline, a transportation enterprise, an administration for electrical power and heating networks, and other subdivisions. In addition, an administration of workers supply, a militarized antiblowout service, and a branch of the scientific reasearch and planning institute, Volga-Ural NIPIgaz, have been created.

The principal amount of construction work at the Astrakhan Gas Complex must be done by organizations of USSR Minpromstroy [Ministry of Industrial Construction] which are building the gas processing plant, the facilities for the construction industry and the infrastructures.

In these organizations the current year turned out to be tense. Beginning in March when the principal forces of the constructors were transferred to the site for the gas processing plant, a delay of plan began to be noted. In June the rate of work was successfully increased and a number of the reasons which were restraining the growth of the productivity of labor were eliminated. However, because of a shortage of highly qualified line engineering and construction personnel, the situation remained complicated.

/ The Trade Union Conference of PO Astrakhan'gazprom,having considered the possibility of the unconditional fulfillment in the current year of the collective's contract and having approved its plan, gave special attention to the unused reserves of the drilling subdivisions. The conference participants noted that there are deficiencies in the organization of the brigade form of labor. Discussion of the socialist obligations adopted by the collectives of the shops, sections, and brigades is being poorly introduced into practice. Bookkeeping is insufficiently organized and the progress of the work and the results of the fulfillment of the individual plans of the workers and of the engineering and technical workers are not sufficiently elucidated. /

To liquidate the lag which had been allowed, steps are being taken in the association, designed to fulfill the plan for drilling operations in the current year.

In 1987 the first phase of the Astrakhan Gas Complex will begin producing. By that time the plant will have been provided with qualified personnel. The basic work for recruiting them for the AGK is being taken on by the managements of the Astrakhan'gazprom and Orenburggazprom associations.

/ Many young people not having special construction skills have come to the construction of the Astrakhan Industrial Center. They quickly become proficient , however, in the education and training center of Astrakhan'gazprom. A system for the training of personnel for the operational services has similarly been formed. The director of this training center, V, Mokrousov, tells about it.

"Our training center was created in April 1985 and, by the beginning of the current year, we already had taught 300 men the principal specialties [diesel and motor mechanics, drilling rig operators, derrick installers, electricians, gas cutters, and so on]. Teachers who are not on the staff are giving us much assistance; namely, the chief of the shop for securing wells,V. P. Dobridnev, the senior process engineer of the water purifying works, I. Kh. Naumov, the senior engineer of the association, G. M. Shirinyan, and a number of others.

At the same time, analysis of what has been achieved [illegible] that there are serious deficiencies in the work; namely, insufficient [illegible]ization by personnel, there is not always highly painstaking discipline, and a lack of visual aids. We are working constantly to eliminate these deficiencies; however we need the assistance of the managements of the subdivisions. But so far, many of them unwillingly send people into training.

Appropriate accommodations are necessary for the normal operation of our training center. They already are being built in the village of Aksaraysk. The PMK [expansion unknown] of our association (chief V. A. Shalashov) is the general contractor. The rate of construction, however,is low. Complicated tasks confront the collective in 1985. This will be the pre-startup period, and already in the following year we should train more than 5000 workers and then again train 10,000 more persons.

It remains to put together a staff of teachers for the training center. Much should be done to raise the quality of the training. Training should be done with all possible training equipment and computers. /

In the building of the Astrakhan Industrial Center, an important feature of the comprehensive approach to the construction is coming through - proportionality. It is expressed first of all by the advance erection of the infrastucture facilities and primarily the dwelling houses. By the time when the operation of the first phase of the complex will begin, additional labor resources - thousands of constructors and installers - must be brought in to build the second phase.

The dwelling construction is being done in the Zaboldinsk region,and in the microregions Yugo-Vostok No. 3 and Nikitinsk knoll. Before the end of 1984, the total amount of operable living space will amount to 150,000 square meters. Basically, nine story large-unit buildings of improved design are being built. Plants in Ryazan, Kazan, Stavropol, Volgograd, Syzran, Derbent, Orenburg, Astrakhan, and Shevchenko are supplying the reinforced concrete structures for the erection of the buildings. Service lines are being laid at rapid rates. Detachments of builders from many regions of the country, and primarily from the cities of the suppliers participate in the erection of the dwelling units of the Astrakhan Industrial Center.

In connection with the fact that in Astrakhan industries are not available to increase the volume of civilian construction, in the Kiri-Kilinsk region the construction of a house manufacturing combine has begun. In the makeup of the complex for large-panel house construction there are: a plant for claydite gravel, a wood finishing combine, and a plant for reinforced concrete articles. In addition, to accelerate the rate of dwelling construction Mingazprom is taking a proportional part in the expansion and modernization of the house building combines of USSR Minpromstroy in a number of regions of the country to create in 1984 new capacity for the manufacture of structures the output of which will provide for the introduction of 115,000-130,000 square meters of dwelling space annually.

The startup of the first phase of the gas complex will add several billion cubic meters of gas to the heat balance of the country and also millions of tons of gas sulfur and petroleum products. The stocks in the deposits permit expanding production in the future. Therefore at present the designers are setting about the solution of the fundamental questions of the building of the second phase of the complex in which the powerful construction staff will be used with the greatest efficiency.

In a short time, along with Baskunchak salt, Astrakhan herring, and Liman watermelons to which people are accustomed, will stand the concept of Astrakhan gas and Astrakhan sulfur.

9136
CSO: 1822/124

OIL AND GAS

UDC 622.236.34

NEW HOLE DRILLING EQUIPMENT LIGHTER, MORE EFFICIENT

Moscow STROITEL'STVO TRUBOPROVODOV in Russian No 10, Oct 84 pp 31-34

[Article by B. F. Sherstyuk, Ye. K. Yastrebov and B. K. Styron, Kazakh Polytechnical Institute, Alma-Ata, and V. G. Udovenko, M. N. Sukholutskiy and V. A. Burdin, Urengoygaspromstroy Trust, Novyy Urengoy: "Flame Drilling of Holes for Pile Supports in Frozen Ground"]

[Text] The rate of development of gas and oil deposits in the northern part of West Siberia depends to a significant degree on the effectiveness with which foundations are erected in complex climatic and soil conditions.

Foundation installation is one of the most labor, material and energy intensive construction processes. Outlays on steaming the ground and drilling pilot holes for piles attain 50-70 percent of the total cost of a pile foundation.

Pile holes are usually drilled in frozen ground by high-power auger drilling rigs following preliminary local thawing of the ground. Use of these rigs in inaccessible regions of the northern part of West Siberia, where up to 40 percent of the territory is marshy, is extremely difficult. Steam generators used to thaw the ground are heavy, and they consume large quantities of fuel and water.

Use of small drilling equipment is most effective in West Siberia. It is capable of high-speed drilling, its energy consumption is low, its mobility is high, and it does not require creation of large machinery repair bases.

The Kazakh Polytechnical Institute has developed several modifications of small thermodrilling rigs and thermodrills for drilling holes for various technological purposes in the Far North and Siberia. Among the latest developments are the small MTBU-D flame drilling rig and the TBVD-60m and TBVD-107m jet-piercing drills operating on the afterburner principle. They are light and simple to operate, and they may be used successfully in erection of gas extraction, processing and transport facilities in the Far North.

Thermodrills break up the ground by the thermal and dynamic action of a high-temperature supersonic gas jet. The gas flow is formed by combustion products (gasoline, kerosine, diesel fuel, combustible gas) emerging from a special nozzle. Hydrocarbon fuel is burned in the combustion chamber of a jet burner.

The MTBU-D unit is intended for hand drilling of holes 80-200 mm in diameter and up to 10 m deep, mainly in frozen ground containing a neglible amount of rocky soil. The unit has a modular design. Its total weight does not exceed 250 kg, and the maximum weight of one integral module is 80-100 kg.

The unit (Figure 1) is a thermodrill consisting of a jet burner *8* and an extension rod *7*. The rod is built up out of individual sections *6* as the hole gets deeper. The sections are strung on pressure hoses *3* prior to drilling. Diesel fuel or gasoline and compressed air are fed to the combustion chamber through these pressure hoses.

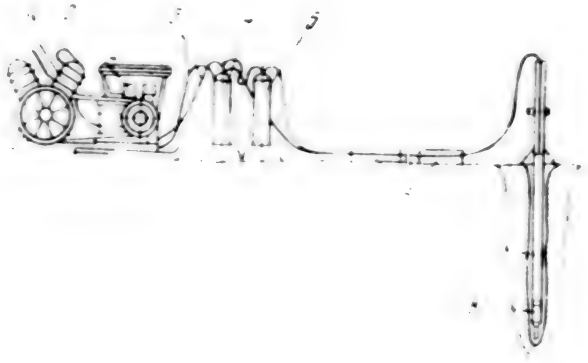

Figure 1. Basic Diagram of the MTBU-D Thermodrilling Unit

The thermodrill power station consists of the following blocks: a UD-2s 6 kw internal combustion engine *2*, a compressor head *1*, a fuel tank *5* and a receiver *4*.

A compressor head from a GSV-1/12 or GSV-0.6/12 garage compressor is used for compressed air. The model 1105-V5 head has a delivery of 1 m^3/min and generates a pressure of 1.2 MPa, while the figures for a 155-2V5 are 0.6 m^3/min and 1.2 MPa respectively. The compressor head and engine are mounted on collapsible frames, and they are equipped with a quick-action lock. The external receiver, which is not rigidly connected to the compressor station, reduces the weight of that one integral module and facilitates movement of the unit around the drilling area. Fifty or twenty-seven liter liquefied gas tanks are used as the external receiver and the displacement fuel tank. The power station outfit also includes pressure hoses 20-50 m long for fuel and air feed.

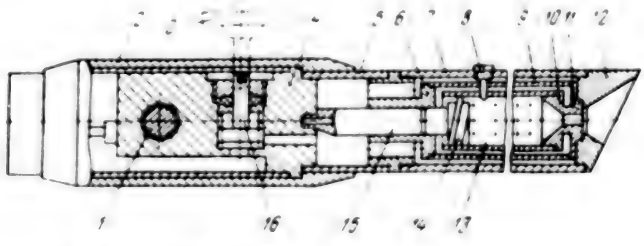

Figure 2. TBVD-60m Thermodrill

The flame burner of the TBVD-60m thermodrill (Figure 2) consists of a distributing head *6* and coupling *5*. The threaded coupling screws on to a choke block *4*. The combustion chamber *13* with its intermediate *9* and outer *7* housings fits in the distributing head. Holes that line up coaxially and which are closed off by bolt *8* are drilled through the combustion chamber and the housing. The combustion chamber *13* terminates with a nozzle cap *10* shielded by a calibrator *12*. There are three 3-mm diameter holes in the face of the nozzle cap. Coupling *15*, the cavity of which communicates by way of a system of holes in the choke block *4* with the fuel pressure hose, fits into the center of the distributing head. An air swirl cone *14* containing a fuel spray nozzle fits on to the coupling. Fuel and air adjustment valves *16* and *1* are built into the choke block. When holes deeper than 5 m must be drilled, the choke block is located in direct proximity to the distributing head, and it is lowered into the hole together with the latter. In this case square openings are foreseen in the valve rods to permit connection of removable knobs *3*. The choke block and valves *16* and *1* are protected against contact with broken-up dirt in the hole by a removable housing *2*. The choke block terminates with a threaded connection for sections of the extension rod. When wells up to 5 m are drilled, the choke block is located at the end of a detachable extension rod 2-5 m long which is connected to the flame burner by coupling *5*.

The unit operates as follows. Compressed air from the compressor head *1* (see Figure 1) is fed by pressure hoses *6* to the receiver *4*, from where it is subsequently fed to the thermodrill. Receiver *4* is connected by a pressure hose to fuel tank *5*, and therefore when the compressor station is working, fuel in the tank is pressurized, and it is displaced into the thermodrill by the pressure hose. After valves *16* and *1* are opened, fuel and air enter the combustion chamber *13* (see Figure 2). Air is introduced into the chamber by a series of radial grooves cut into its lateral surface, and as it flows through, it cools the combustion chamber and the intermediate housing.

Part of the air enters the chamber by way of a ring gap between chamber *13* and the face of the distributing head *6*. This flow of air is swirled by swirl cone *14* and promotes fuller mixing of the fuel with air in the first section of the combustion chamber. The fuel mixture is ignited by an electric ignition device or by an open flame through a hole in the combustion chamber or the nozzle in cap *10*. The combustion products are shaped by the nozzle into a jet that is ejected at a velocity of up to 1,500 m/sec. When this flow strikes the bottom of the hole, its deceleration temperature attains 2,000°C.

Part of the air is fed from the circular chamber between the intermediate and outer housings through hole *11* in the nozzle cap into the flow of the combustion products in order to burn any extra fuel that had not been burned in the chamber. The chemical reactions increase heat transfer into the surrounding ground and increase the drilling effectiveness by a factor of 1.3-1.5.

Technical Characteristics of the TBVD-60m Thermodrill

Outer diameter of thermodrill, mm	60
Inner diameter of combustion chamber, mm	34
Diameter of nozzle throat, mm	8-12

Fuel	Gasoline, kerosine, diesel fuel
Oxidizer	Air
Fuel consumption, kg/hr	3-15
Air consumption, m^3/min	0.6-5
Pressure of fuel components, MPa	0.5-1
Hole drilling diameter, mm:	
in rock	80-90
in frozen ground	90-200
Average drilling rate, m/hr	
in rock	up to 5
in frozen ground	up to 50
Drilling depth, m	up to 10
Weight of thermodrill's burner, kg	8.5
Weight of one 1.2 m extension rod section, kg	2.5
Weight of thermodrilling unit together with extension rod outfit, kg	250

The TBVD-107m thermodrill is intended for drilling holes up to 450 mm in diameter and up to 10 m deep. Its compressed air feed requires a compressor with a delivery of 8-10 m^3/min.

The thermodrill consists of a flame burner and an extension rod. The basic structure and operation of the flame burner of the TBVD-107m thermodrill are similar to the structure and operation of the flame burner of the hand-operated TBVD-60m thermodrill.

The TBVD-107m thermodrill may be suspended from any kind of hoisting device--a truck-mounted crane, a pipelayer or a special support unit. Thermodrills are raised or lowered together with sections of extensible rods by a hand winch. The extension rod is lengthened as the hole grows deeper. The height of the supporting unit must permit suspension of the thermodrill 3-5 m above the ground surface. If the suspending height of the supporting unit is lower, the length of the extension rod sections added on as the hole is drilled must be reduced to 1 m.

Technical Characteristics of the TBVD-107m Thermodrill

Outer diameter, mm	107
Combustion chamber diameter, mm	59
Length of combustion chamber, mm	240
Diameter of nozzle throat, mm	17
Fuel	Gasoline, kerosine diesel fuel
Fuel consumption, kg/hr	30-35
Pressure of fuel components, MPa	0.6-0.7
Compressed air consumption, m^3/min	9-10
Weight of thermodrill's burner, kg	12
Weight of thermodrill (when drilling holes up to 8-10 m deep), kg	200-300

Average drilling rate through frozen ground, m/hr . . .	8-20
Drilling depth, m	10 and higher
Diameter of drilled hole, mm	150-450

Flame drilling of holes from 0.5 to 10 m deep was carried out in different regions of the North and West Siberia. The experience of hand drilling of holes at construction sites of the Urengoy gas-condensate deposit is of considerable practical interest. After the flame drilling method was introduced here, over 160 m of holes from 1.5 to 5 m deep were drilled. The average drilling rate was 30-40 m/hr.

Earth in the deposit's vicinity consists of fine and medium sand in a permanently frozen state with a temperature of 0.0-0.2°C. The permafrost roof is situated at a depth from 4 to 7 m. The thickness of the layer of seasonal freezing-thawing is about 3.5 m.

The surface layer of earth subject to seasonal freezing consists of sandy loam up to 1 m thick. This is underlain by fine and medium sand. Seasonally freezing earth is in a water-logged state, and when a site is prepared for construction, it is replaced by a layer of thawed sand of up to 1 m, which is compacted in layers. Prospecting revealed ground water at the 4.2 m mark.

Flame drilling of holes at the construction site of the Urengoy compressor station was carried out with TBVD-60m and TBVD-107m thermodrills. The thermodrills were equipped with extension rods 42 mm in diameter and 4.5-5 m long. Air was fed to the thermodrills by a mobile PKS-5.25 compressor with a delivery of 5 m^3/min. Holes were drilled at the construction site in swampy water-logged plots, the state of which would not permit high-power drilling equipment.

The drilling rate with respect to hole depth was irregular, and it depended to a significant extent on ground structure. It took 1-1.5 min to drill through the upper fill layer up to 1 m thick. Drilling was accompanied by intensive removal of coarse-grained red-hot sand. Then the drilling process slowed down abruptly, and it took up to 2-3 minutes to drill the next 30-50 cm of the hole. Caked and fused clay was removed from the hole together with exhaust gases and medium sand.

The drilling rate for the lower sections of the holes was basically 50-60 m/hr, decreasing negligibly in two or three sections for 10-15 cm.

As the holes grew deeper, the nature of the breakdown products removed from the hole changed: Fused particles became fewer in number, coarse fractions of sand disappeared, and the quantity of gases and sand ejected from the holes dropped. At the 3.5-4.2 m mark ejection of combustion products and sand from the holes ceased completely, and the thermodrills virtually fell through the dirt. The last 1-1.5 m of the holes were drilled in 15-20 sec. At this mark the thermodrills often got stuck in the effort to remove them from the holes owing to the stepped transition from the burner head diameter of 60 and 107 mm to the extension rod diameter of 42 mm. One or two minutes after fuel and air feed

was stopped, the thermodrills were easily removed. Sticking of thermodrills in the lower part of the hole was completely eliminated by artificially reducing the drilling rate to 30-40 m/hr at a depth of 3.5-5 m.

Hole diameter depended on drilling rate. In the upper part, which was drilled through fill, the hole diameter was 90-100 mm when a TBVD-60m drill was used (burner diameter 60 m), and 120-140 mm when a TBVD-107m thermodrill was used (burner diameter 105 mm). Lower down, the hole diameter increased to 150 mm (for the TBVD-60m thermodrill) and 200 mm (for the TBVD-107m thermodrill). When operating thermodrills were raised and relowered into the holes, their diameter increased to 250-350 mm along the entire length.

Several paired holes located 100-200 mm apart were drilled with a TBVD-107m thermodrill in order to achieve a hole diameter of 400-500 mm.

Despite the fact that the drilling process was accompanied by removal of dry sand and complete absence of slurry, the holes filled with water 5-6 hours after they were drilled. Obviously during drilling, water that saturated the surrounding sand was squeezed out of the side walls of the hole by exhaust gases. The entire process of drilling one hole 4.5-7 m deep took 7-9 min--that is, the average technical drilling rate was 30-40 m/hr.

Effect of Frozen Ground Properties
on Hole Flame-Drilling Rate

Ground Type	Drilling Rate, m/hr	Drilling Depth, m	Hole Diameter, mm
Frozen clayey-stony and stony sandy ground, lumps up to 4 cm in size (Buryat ASSR)	4-6	1.5-2	80-100
Frozen chunky deposits of quartzitic sandstone (Buryat ASSR)	6-8	1.5-1.7	80-100
Peat bogs with a low pebble content (Aldan, Yakutsk ASSR)	15-20	2-3	90-120
Finely dispersed loam and clay of varying moisture content (Seyakha, Yamal Peninsula)	7-17	5-10	100-180
Moist clay, loam and sandy loam with pebble interlayers (lower reaches of the Ob, Labytnangi)	6-12	8-10	100-120
"	20-30	2-3	100-120
"	5-8	4-5	350-450

Moist clay, sandy loam (Messoyakha-Norilsk gas pipeline route)	10-12	3-5	180-200
As above (dry)	4-6	3-5	180-200
Loam with a high moisture content (Cherskiy Peninsula, Yakutsk ASSR)	20-25	2-3	180-250
Fine sand, loam (Novyy Urengoy)	40-60	1.5-5	120-200

During construction of Integrated Gas Treatment Installation No 9 a TBVD-60m thermodrill was used to drill holes 1.5-2 m deep for tubular supports 100 mm in diameter, intended for installation of wire mesh fencing.

The low weight and size of the thermodrill and its flexible connection to the air compressor and the displacement tank used for fuel feed made it possible to drill 20-30 holes without moving the compressor. A deflector--half of a metal barrel cut along its long axis--was used to protect the driller from red-hot sand ejected from the hole. A hole was cut in the side of the barrel for the thermodrill, and another hole was cut into one of the ends to permit ejection of gases and broken rock.

The supports were installed as the drilling proceeded. It took not more than 3-4 min to drill one hole; this includes the time for moving from one hole to the next. The technical rate of flame drilling attained 60 m/hr. The annual economic impact from introducing thermodrills in the Urengoygazpromstroy Trust was 348,000 rubles.

The experience of flame drilling of holes in different climatic and geological conditions showed that drilling effectiveness basically depends on the properties of the dirt, its granulometric composition and its moisture content. The influence of moisture on drilling depends on many factors. In addition to affecting hole diameter and drilling rate directly, moisture predetermines the nature of the removal of breakdown products and the stability of hole formation. In clayey dirt with a negligible moisture content, water was added to the well to increase the drilling rate and its stability and to eliminate the possibility of caking of clay. The rates of hole flame-drilling depending on the properties of frozen gound are shown in the table.

The thermal method consumes less power than the steam thawing method, since all of the heat is utilized purposefully in the drilling of holes of the required diameter and depth. When a pile is lowered into such a hole, there is no need for powerful piledriving equipment and vibratory pile drivers. Disturbance of the surrounding environment and of permafrost conditions is minimized. The productivity of the process increases by a factor of 2 or 3.

In comparison with the mechanical method of drilling pilot holes, with the thermal method there is practically no wear of the drilling tool, since there

is no mechanical contact with the hole bottom. There is no need for applying a load upon the hole bottom during drilling. The possibility arises for using the same drilling tool (employing thermodrills) to drill wells from 120 to 450 mm in diameter. The thermal method makes it possible to drop a hollow pile without first drilling a hole with a thermodrill; in this case the thermodrill is located inside the pile, and it is raised back up after the pile is dropped into the ground. The drilling rate is increased by a factor of 1.5-2, while the outlays on erecting pile foundations decrease simultaneously by a factor of 2-3.

11004
CSO: 1822/66

OIL AND GAS

UDC 553.002.2

GAS TREATMENT PLANT ASSEMBLED OUT OF FLOATING MODULES

Moscow STROITEL'STVO TRUBOPROVODOV in Russian No 10, Oct 84 pp 9-10

[Article by V. N. Golovkin, Orgtekhstroy Trust, Sibkomplektmontazh Association, Tyumen: "Basic Concepts for Buildings and Structures of the Yamburgskoye Deposit"]

[Text] The party and government attach important significance to developing the Yamburgskoye gas-condensate deposit. A CPSU Central Committee and USSR Council of Ministers decree on measures to promote development of the Yamburgskoye deposit states that its accelerated development is to proceed using the latest accomplishments of science and technology and highly productive equipment, and with wide introduction of automation and mechanization into production processes, in combination with environmental protection measures.

Development of the Yamburgskoye deposit, which is located in Tyumen Oblast in a zone of harsh natural and climatic conditions of the subarctic latitudes, required new concepts for layout planning and for production organization.

Planning of facilities for the Yamburgskoye deposit is unique in that traditional concepts for construction of integrated gas treatment installations, according to which materials, metallic structures, piping, construction equipment and blocks are delivered to the site separately and are assembled locally, have been rejected. More-industrial methods have been foreseen for erecting the facilities. The YuzhNIIgiprogaz and the SiBNIPIgazstroy [Siberian Scientific-Research and Design Institute for the Construction of Gas Facilities] are finishing the working specifications for the layout of the Yamburgskoye deposit using pontoon modules on a wide scale (Figure 1).

A pontoon module is a class M nonself-propelled vessel (in the classification of the RSFSR River Registry) permitted to navigate class M inland waterways without restrictions in permissible weather.

The pontoon module is 20 m long, 12.2 m wide and up to 16 m high, and it weighs up to 260 tons. The bottom of the pontoon module curves upward 15° at each end. The pontoon hull corresponds to the requirements of the Rule and Norms of the RSFSR River Registry. The pontoon module is divided into three compartments. It retains its buoyancy when anyone of the compartments or if the two outer compartments are filled with water. Equipment of the integrated gas treatment installation, including the largest, except for adsorbers, fits inside the

Figure 3.

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The plan calls for building each UKPG at the Yamburgskoye deposit out of 26-28 pontoon modules. The UKPG-1 and the UKPG-2 are to be made up of 22 pontoon modules each. Later on, as the Valanzhinskiye deposits are developed, the facilities will be expanded by the addition of other structures, also assembled out of pontoon modules.

The gas preparation building for UKPG-1 and UKPG-2 consists of four pontoon modules, the production building for regeneration of diethylene glycol and methanol consists of 12, the DYe16-14GM boiler shop consists of 3, and the installation for heating water from the water pump house consists of 3 pontoon modules. The plant cost of enough pontoon modules for one UKPG is 6.1 million rubles.

In late 1983 the first two pontoon modules for a DYe25-14GM boiler shop intended to service the housing compound were sent from Tyumen to Yamburg. The total length of the water route was 2,110 km, and time en route was 35 days. The first leg of the journey was over ice-free water, but in the Gulf of Ob the modules had to be transported through slush ice and vast ice fields 10-20 mm thick.

The pontoon modules were dragged ashore by D-355S caterpillar tractors. Two tractors were required to drag the auxiliary pontoon module weighing 186 tons. Four tractors were used for overland transport. Four tractors dragged the 255 ton pontoon module bearing the boiler units ashore, and six tractors transported it overland.

After being dragged ashore, the pontoon modules were set down on pads until spring. In May they were dragged overland (on snow) 5 km to the housing compound.

Plant assembly of the pontoon modules and their transportation over water and land made it possible to significantly reduce transportation expenses, the laboriousness of work at the construction site and the facility erection time, and to greatly improve the quality of construction and installation.

But at the same time there were a number of complaints concerning the structure of the pontoon and the organization of transportation. It would have been much easier to drag the pontoon modules ashore and transport them overland using air cushion technology. Use of air cushion technology is planned on a wide scale in the future for transportation of pontoon modules.

Pontoon modules (supermodules) are being assembled by the Sibkomplektmontazh Association at a site by the bank of the Tura in the town of Mys (Figure 2 [not reproduced]). Development of the Yamburgskoye deposit required a sharp increase in production of pontoon modules. The association created a mechanized assembly column out of its pontoon module production section. However, the production possibilities of this base are limited, and they cannot support the required rate of development of the Yamburgskoye deposit. Construction of a supermodule assembly base must be accelerated near Tyumen, where a highly effective production process could be organized.

Twelve pontoon modules for the diethylene glycol and methanol regeneration building and four pontoon modules for the boiler shop are to be sent from Tyumen to Yamburg in the 1985 sailing season.

Generalization of the results of manufacturing and transporting the pontoon modules will make it possible to draw up and introduce recommendations on organizing construction of modular facilities so that the greatest impact could be achieved.

11004
CSO: 1822/66

OIL AND GAS

KRASNOYARSK OIL EXPLORATION

Moscow PRAVDA in Russian 23 Sep 84 p 3

[Article by special correspondents V. Lisin and V. Prokushev: "Krasnoyarsk Petroleum" under the heading: "Around the Land of the Soviets"]

> [Text] From a paragraph in the decisions of the 26th CPSU Congress: "Carry out the measures for exposing the deposits of oil and gas in the territory of West and East Siberia...." (from: "The basic directions of the economic and social development of the USSR in the years 1981-1985 and the period up to 1990.")

Among the conifers of the taiga of Evenkiya you will not immediately find the drilling derrick of the young foreman, A. Ganzhi, which resembles a gigantic peaked spruce. But the short radiogram sent from here the past winter to the effect that there was oil, at once riveted attention to it. Although, it must be said, this information met with distrust. Oil suddenly will spout for several days there, and then the well goes dry. Actually, it was this same Evenkiya Kuyumba which, in the mid-1970s was spoken of as a large deposit of "black gold". But in the results, the oil only teased the geologists. Can it be that there is a mistake here? Specialists flew out to A. Ganzhi's drilling rig.

The well was studied for a long time and very carefully. The opinion was unanimous even though cautious. At the Sobinsk gas concentrate deposit, the first inflows of oil having industrial significance had been obtained.

For a long time they have been seeking oil beyond the Yenisey, that blue meridian that crosses our country. In the present year, a half century has passed since the first prospectors for valuable raw materials landed in Krasnoyarsk kray. Since that time they discovered about two score gas condensate deposits; but the idea of " Krasnoyarsk oil" began to find reality only on the eve of a unique anniversary.

Our country is the only one in the world among large industrially developed states, whose economic growth is based on its own energy resources. In the years of the past five-year plans a sharp increase has been taking place in the relative importance of the eastern regions of the country in providing the national economy with oil, gas, coal, and electric energy.

The largest base for the production of oil in the country has been established in Tyumen oblast. In the opinion of specialists, there is a long life in prospect for it. But, inasmuch as the energy potential of the country to a large degree is determined not only by the availability of oil and gas now but also in the foreseeable future, it is necessary to see to the development of a new large base for the hydrocarbon raw material beyond the Yenisey.

Planned searches for the "black gold" in the Krasnoyarsk kray began at the beginning of the 1950s. The trust Minusinskneftegazrazvedka [Minusinsk Oil and Gas Prospecting Trust] was organized at that time. Step by step the geologists from the rich southern places in the foothills of the grey Sayan ascended into the arctic tundra of the Taymir. The prospectors of the deep connected particular promise for oil in Krasnoyarsk with the so-called Siberian platform - the territory including the basins of the Podkamennaya Tunguska and the Nizhnyy Tungusk rivers.

The important work of the oil prospectors is constantly in the view of the CPSU kraykom [kray party committee] and the krayispolkom [kray soviet executive committee]. Many party, soviet, and economic organizations at the places give aid to the prospectors. Also, the geologists did not stand still. Over the past years, notable organizational changes have taken place for them. New geophysical and oil and gas prospecting expeditions were created and the specialized production associations: Yeniseygeofizika, Yeniseyneftegazgeologiya, and Vostsibgeologstroy were formed. Yet there are no results at present. Why?

V. Nakoryakov, the general director of the Yeniseyneftegazgeologiya association, has been searching for oil in the kray for thirty years. He has seen much in his geological lifetime, namely, scepticism that there may be hydrocarbon resources here, rare moments of success, and disappointments.

"Our principal error was that we underestimated the difficulty of the geological plan" said Vasiliy Dmitriyevich in a conversation with us. "The successes of the Tyumen people went to our heads. We began to use their methods of searching. But Krasnoyarsk oil requires its own special approach."

One does not envy the Siberian geologists. While the Tyumen people get stuck in bogs and get cold in the arctic wind, the Krasnoyarsk people, with all of that, are obliged in addition to overcome mountains. Almost the whole territory is a zone of trap and magmatic rock. At the dawn of the history of the Earth, red hot flows of magma struggled to shoot up but did not, solidifying with the diabasic, basaltic and the other hardest sheets in the upper layers of the so-called sedimentary mantle. Here they "spoil" the whole picture.

While the Tyumen geophysicists, with explosive shots or powerful blows, send an elastic wave into the depths which, from depths of several kilometers, brings up information about everything the earth hides, for Krasnoyarsk people a freak of nature results in a spoiled telephone - the massive layers mangle the signal and do not give the usual intelligible picture.

It stands to reason that such a natural phenomenon was found out not just today or even yesterday. Nevertheless, now, when the country has risen up in earnest before the problem of developing another new fuel and energy base, in the equipment of the geologists scientifically substantiated methods of searching for important mineral rescurces are missing.

It must be recognized directly that neither the union nor the republic ministry of geology has displayed the persistence necessary for the widespread development of prospecting operations in this region. Until recently they have accepted the situation in the prospecting organizations here of a low productive and technological discipline which does not respond to the modern demands for the level of production organization, weakly propagates advanced experience, and poorly trains personnel. As the result, there are large losses of time because of accidents and the liquidation of wells without obtaining sufficiently complete information from them.

The departmental disunity is a hindrance. Creating specialized subdivisions for geophysics and drilling would seem to be good business. Indeed, the "pluses" of this innovation are considerable - specialization permits raising prospecting operations to a higher technical level. But the "minuses" are not small either. Principally, this is because of the absence of the necessary contacts between the partners situated at the same time in different places; namely, in Yeniseysk and Krasnoyarsk. Each of them is so independent that it does not consider it necessary to mutually coordinate prospecting plans. It is here that the geophysicists have "turned in the structures", fulfilled the plan, and received the prize but on whether there will be oil or not - that is not their concern. This quality of their work is such that the drillers with their rigs have to wander practically blind around the hills.

To put their own house in order is one of the vital problems of the geologists. They require, however, the assistance of the other ministries and departments. All the time in all the regions, the prospectors of the depths are inconvenienced by the problem of transportation. The main roads for the Krasnoyarsk geologists are the blue rivers. The rivermen are annually increasing the volume of transportation, but they are satisfying only about half the needs of the geologists. Navigation on the Yenisey goes on from June to September. But on the tributaries of the great river, for less time. On several of them, cargoes can be transported only during times of high water and then in shallow draft ships of which there are an insufficient number in the Yenisey Steamship Company.

Thus, into Vanavara, one of the geologists' support points, it must be possible to deliver practically everything that is necessary for a year of work in one trip. And the problem here is not only in the skill of the rivermen or in their capabilities, but in the fact that the oil and gas prospectors can in no way obtain a year's supply of material resources. And this means that very many cargoes have to be delivered by aviation.

Of course, in a definite sense, the frosts come to their aid. In recent years, in the delivery of cargoes from an expedition's base to the work place,

wide use has begun to be made of winter roads whose extent is growing annually by almost 2,000 kilometers. This requires cross-country transport vehicles of which there are practically none now. The northern version of trucks differs little from ordinary ones.

The builders of drilling equipment also are obligated to the geologists. It goes without saying that the people of the Ural Machinebuilding Plant have made a good, powerful, and reliable tool, but it is for production drilling. For exploratory drilling, there are the tools of the Volgograd "Barikad" Plant. They are heavy and cumbersome, and they have to be carried around the hills and swamps. However, despite the repeated and persistent requests of the geologists, the Volgograd people continue to produce heavy equipment.

The way to recruit and retain personnel for work in Krasnoyarsk kray is well known; namely, the development of normal living conditions. Little is being done in this direction. During the present five-year plan more than 30,000 square meters of dwellings and cultural facilities have been built. The needs of the geologists still are not being fully satisfied.

We are holding a test tube of dark liquid - it is the first commercial oil produced beyond the Yenisey. This is visual confirmation that the Krasnoyarsk geologists are on the right track. Their principal discoveries are still before them. It is important now, in the period of the formulation of the plans for the next five-year plan, not to lose sight of their needs and concerns and to provide effective assistance. Our future oil is there, beyond the Yenisey!

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OIL AND GAS

OILFIELD EQUIPMENT QUALITY CONTROL PROBLEMS

Moscow PRAVDA in Russian 27 Sep 84 p 3

[Article by S. Nikolayev: In the USSR Committee of Peop[le's Control - "Why the Idleness at the Well?" under the heading: "From the People's Control", Issue No. 17(437)]

[Text] Today, as is known, oil is not ladled out of wells with buckets, but is extracted with the aid of complex and expensive equipment. One does not manage without units for the repair of wells, pumping units, Christmas trees, self-propelled compressor plants, and much more. The enterprises of Minkhimmash [Ministry of Chemical and Petroleum Machine Building] manufacture all this equipment.

People's controllers inspected 10 of the 27 specialized plants of the industry. They manufacture equipment worth 260 million rubles a year for the oil producers. But almost a fourth of it is delivered to users with defects for which they are charged millions of rubles in penalties. Giving up the penalties, however, the machine builders continue to produce unsuitable articles.

Such a practice costs the country dearly. For one and a half years in the Nizhnevartovskneftegaz and Yuganskneftegaz associations alone, because of the idleness of practically new but defective equipment, more than 250,000 tons of oil was not produced. Great sums are being expended on the restoration of the machines and units.

There is an especially troublesome situation with the quality of the products being made at the enterprises of the VPO [All-Union Industrial Association] Soyuzneftemash (chief engineer, S. Kuliyev). Almost a third of its articles have defects. Defects are not rare even for products having the State Mark of Quality.

There are serious deficiencies at the Lt. Shmidt Machine Building Plant in Baku. For example, a UPT1-50 moveable hoisting installation was delivered from there to the Poyskovskiy administration for production transport of Glavtyumen'neftegaz and very soon a heavy part on the mast broke, causing an accident. As a whole, of 157 machines of that type which were inspected, 109 had serious defects.

Ten sets of Christmas trees were sent from this same plant to the address of the Belozerneft' administration. Eight of them (even with the mark of quality) were defective. The shops of the enterprise are dirty and the equipment is run down. Welding operations are not monitored by special instruments and therefore are done haphazardly. Little attention is given to production engineering in the manufacture of parts; indeed, such production engineering frequently is simply absent.

Instead of putting things in order, the quality control department of the plant is content simply to "improve" the quality of the articles by distorting reports about product quality. All this has been conducive to the enterprise having, over two years, sent out 16 million rubles worth of unreliable equipment.

The picture at the Borets Industrial Association in Moscow (chief engineer, Yu. Gribov) is not much better. Here, in particular, the moveable SD-9/101 compressor stations are made. At the time of the inspection, of 108 such units received by clients, 89 did not work. The reason? - plant defects in the basic compressor unit. There were cracks in the cylinder castings, scored bushings, and much obvious evidence of manufacturing irresponsibility.

Yet, over three years, not one worker of the association, guilty of gross violations in the manufacture of the product, was penalized.

The bad workers from Minkhimash, however, failed to escape responsibility. Gosstandart [State Committee on Standards of the USSR Council of Ministers] removed the State Mark of Quality from five denominations of articles. The plant was instructed to exclude 16.4 million rubles from the account of amounts realized from production, and to pay 1.1 million rubles into the revenue of the union budget from its profits. Until the exposed deficiencies were eliminated, the sale of eight kinds of oilfield equipment was forbidden.

The USSR KNK [Committee of People's Control declared severe disciplinary penalties for S. Kuliyev and Yu. Gribov. On the former a money fine of 1,200 rubles was imposed, and on the latter, 600 rubles.

It was noted that S. Kuliyev asseses the situation being created unself-critically and tries to justify the derelictions in his work with all manner of reasons. He had anticipated that in the event of failure to remedy the deficiencies exposed by the inspection,he would be held more strictly accountable.

A reprimand was issued to the deputy of the Minister for Chemical and Petroleum Machine Building,V.Reznichenko, who allowed the production at the subordinate enterprises of equipment of poor quality, and who also took a careless attitude toward the numerous indications of these deficiencies. Considering his declaration that the ministry is taking measures to remedy the deficiencies uncovered, the director of the Lt. Shmidt Machine Building Plant in Baku will be held accountable as well as the leaders of other enterprises who have permitted the production of low quality oilfield equipment.

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OIL AND GAS

WORK INCENTIVES IN OIL AND GAS PROSPECTING

Tashkent PRAVDA VOSTOKA in Russian 23 Oct 84 p 3

[Article by A. Goncharov, senior engineer of an experimental methods expedition of the Central Asiatic Scientific Research Institute of Geology and Mineral Resources: " Exploration at Ustyurt"]

[Text] Three short years ago, during a test of one of the wells, light oil without sulphur impurities was observed. To all indications, the well only touched the edge of an oil-bearing area the center of which was under the Barsakel'mes salt swamp. A drilling rig had been mounted on Shaytankal island and a well had been sunk, but it gave no oil. But the geologists of the Ustyurt geophysycal expedition stubbornly continue the search.

Everything that happens here can be named with one word - overcoming. The overcoming of severe natural and climatic conditions which have stabilized, but in which there are disputable opinions and notions on how exploration must be conducted in Ustyurt conditions. And, finally, there is the search for more effective methods in geological exploration which lead to success.

"Until recently, the effectiveness of our geophysical investigations was low" says the chief geologist of the Ustyurt geophysical expedition, V. Korablina. "From 42 structures prepared by seismic exploration and transferred to deep drilling, more than thirty areas were drilled out. And at only two of them - Kuanysh and Shakhpakhty - deposits of gas and condensate were uncovered. In the second half of the 1970s they began to use modern methods of seismic exploration, thanks to which good results were obtained in the areas: West Barsakel'mes and Central Kushkair. An Akchalak area also has turned out to be promising. In the drilling and testing of four wells here, significant inflows of gas and condensate were obtained. The calculation of the gas resources is being continued. We are also seeking ways of increasing the effectiveness of geophysical investigations. Field parties are working according to the method of succession, trying to reduce the time for preparing an area for deep drilling."

" The Kara-Kalpak Oil and Gas Exploring Expedition is engaged in this kind of geological exploration. Its work is hot. The drillers are fighting to reduce the time for sinking wells and to lower the cost of the operations. And they are highly successful. That well which B. Zhumashev's brigade sank in record

time as ordered for Ustyurt oil in a past year, twice has captured the title of best in the trade among the brigades of the USSR Ministry of Geology , and testing was done by the brigade of foreman I. Karimov. These collectives are now the leaders of the competition."

What is the source of the successes of B. Zhumashev's brigade and the expedition as a whole? A simple answer to this question does not answer it. There is a firm labor discipline in the expedition. All the brigades work according to the method of collective contract. A competition has been organized among them for the achievement of high technical and economic indicators. B Zhumashev's brigade competes with the brigade of drilling foreman G. Kvon. The struggle for preeminence goes on with varying success, but more often Zhumashev's collective holds the upper hand. However Kvon is not yielding. He is confident that sooner or later he will be able to come out ahead.

The observations of Georgiy Mikhaylovich Kvon are interesting on the subject of how the method of collective contract has influenced the attitude of the workers toward the drilling equipment, production materials, and their own work.

"The people at the well site have become more economical, more zealous proprietors" says he. " How was it before? In moving to a new site, the mud powder or chemical reagents left at the old site were abandoned. In order to empty the tanks, drilling mud was poured out on the ground. Now everyone has turned over a new leaf. Nothing is wasted, everything goes into the business. The saving is large. Moreover, idleness at the well site because of shortages of spare parts or production materials. In registering a drilled well with an evaluation of 'excellent', everyone in the brigade is paid a bonus - thirty percent of the cost of materials saved - on the condition that the coefficient of labor participation of a worker in the whole cycle of the drilling is not less than 0.7. If this coefficient is lower, then, according to the conditions of the contract, a bonus is not received. Correspondingly, 20 or 10 percent of the cost of material saved is paid to a worker in registering wells with an evaluation of 'good' or 'satisfactory'."

It has become disadvantageous for a worker not to show up for work for one or another reason or to carelessly expend production materials. It is more costly to him himself.

In short, in both of the expeditions occupied in prospecting for material resources in the Kara-Kalpak part of Ustyurt, they are searching not only for oil and gas, but also for new forms and methods of organizing and stimulating labor, and educating people.

Before, to drill a new well, B. Starokozhev, the chief of the Kara-Kalpak oil and gas prospecting expedition, comes to a brigade together with the leading specialists of all services. They evaluate the work of the brigade on a registered well, they note deficiencies, and they hear out the wishes and proposals of the workers on the organization of the drilling on the new well. Here also, they present bonuses to the drillers.

Much is being done in the expedition to provide publicity and comparability for the results of the competition and the possibility for the repetition and spreading of advanced experience.

A new brigade has been formed. U. Sultanov, diesel-mechanic-motorist; B. Batyrov, drill pump operator; B. Ibragimov and other specialists--ten persons altogether have been transferred to the new brigade from that of B. Zhumashev. Young people have arrived in the brigade on the shift with them. But the collective has not weakened its position. The experienced specialists, driller D. Bayramov, diesel mechanic and motorist F. Manzulin, and driller N. Aytmuratov have assisted the novices to enter into the business quickly. So, knowledge, experience and skill are being transferred from person to person and from brigade to brigade - all this is what we call progressive experience.

Over the years of the search for oil and gas in Ustyurt, many foremen for this business have been trained. Many of them, for selfless labor have been honored with governmental awards. Here, in truth, any feat by a person is organized and makes the person famous.

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OIL AND GAS

ARCTIC DRILLING RISK TOO GREAT, FIELDS DECLINE

Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 11 Nov 84 p 2

[Article by V. Krukovskiy, correspondent for SOTSIALISTICHESKAYA INDUSTRIYA, Ukhta: "Avoiding Sharp Corners"]

[Text] The article "Arctic Oil," which appeared in the July 12 issue of this paper, elicited conflicting responses. RSFSR Deputy Minister of Geology V. Nizyev sent a response. Admitting the importance of the questions treated in the article, he unfortunately answered them according to the well known evasion principle "so that yes, then no." His reply is plentifully equipped with all manner of qualifying expressions, such as "basically," "in the degree it is possible," "to date one cannot consider it (the structure of geological prospecting management--V. K.) ideal," "the ministry intends to examine the question," etc.

The article addresses the fact that one of the field's most important oil recovery associations, Komineft, was literally grounded through the fault of prospectors. It has been 2 years since the republic's most important fields, the Usinsk and Vozey, entered a period of declining yield. The oil workers are at a crossroads--which way to go? Today there is not a single prepared pool in the process stock that might sustain the region's high (almost 20 million [bb]) oil yield. Yet there are all sorts of opportunities for this.

As far as the association's activity, there are many promising areas and fields, the evaluation of which has been inexcusably delayed. At the same time the RSFSR Ministry of Geology scatters over a vast territory the already limited meterage of deep drilling and material resources. In his reply to the editor, the chief geologist of oil-prospecting expedition No. 4, P. Tarasov, with references to the history of Soviet geology, attempts to excuse this situation with the necessity of looking ahead and prospecting over a wide territory. Who would argue with this! But this includes the manager's planning skills and talant to correctly determine which part of the resources to assign to the distant future and which to today's and tomorrow's needs. Otherwise there is the risk of losing more than is found. Nor does the increasingly complex management structure of the region's prospecting facilities help to concentrate prospecting in the most important directions.

Where are the oil workers to go? And Kharyaga? This recalls P. Tarasov's letter. "This field surpasses the Vozey in resources; it will be handed over

to oil workers this year." Let's understand how much oil workers can really develop the Kharyaga field today. Deputy Minister V. Nizyev and especially P. Tarasov should know that the paraffin content of Kharyaga oil fluctuates with different deposits from 10 to 40 and more percent. Will it be possible in Arctic conditions to transport by pipeline oil that congeals at temperatures above 36 degrees?

"I'm afraid oil workers will have to lay a railroad here," says V. Pelevin, chief of the Northern Oil Trunk Line Directorate and a noted oil pipeline transport specialist in the North, in answer to my question. "It will hardly be possible to force Kharyaga oil into the pipe."

Thus oil workers are now studying the possibility of sending more transport raw material from Vozey to Kharyaga (pumping it in the opposite direction to the north), in order to dilute the local oil. A variant of the solution is being developed for the already prepared but distant Southern Khyichuyus field, so that a more pliable raw material might be sent from there to Kharyaga. So an agonizing choice lies ahead, not without risk--what to do and how to do it. A lot of time is required for all this. These are the facts.

"The article correctly remarks," writes Comrade Nizyev, "that the southern Khoreyver basin should be examined as the most important region for preparation of new oil fields. The ministry is constantly increasing the work volumes in the confines of this basin." Numbers go further. Drilling here has increased from 12,000 to 42,000 meters in 5 years, says the deputy minister.

How will this growth look in the shift to deep exploratory wells? Simply meager. This is most eloquently apparent from the fact, for example, that up to 70 percent of the incremental oil reserves is realized in areas near the Usinsk oil-recovery rayon. However, at the same time less than 30 percent of the already small volume of exploratory drilling by the Ukhta Oil and Gas Geology [Ukhtaneftegazgeologiya] Association is concentrated here. And if we take the developed meterage as a whole for the region, then this ratio will be even less.

In his letter to the editor, P. Tarasov indicates that the Bagan, Sandivey, Musyurshor and other fields in the Khoreyver basin were opened from 1981 to 1984, modestly failing to mention when these areas were handed over for exploration. The Bagan structure underwent drilling 10 years ago and the Sandivey 5 years ago. Not too far from Vozey the Komandirshor area has been awaiting its hour for 15 years. Indeed the Kharyaga structure was only opened in 1970. Hence it is completely clear that the volumes of exploratory drilling in the region are obviously inadequate to sustain systematically the attained level of development of the oil and gas industry.

The first thing that the RSFSR Ministry of Geology should do is admit the trouble of the arisen situation. Then one could start thinking how best to rectify it. In addition, a distinct effort to avoid sharp corners creeps into Comrade Nizyev's reply. "Today the province possesses considerable reserves to sustain and even augment oil recovery," he writes. He attempts to support

these arguments with such numbers as: 48 fields with recoverable reserves were opened and only 14 of them are being developed.

In fact many fields are not put into development for 5 to 10 years. This argument looks very impressive if one fails to mention the chief thing. In essence, these fields are scattered over a vast territory, sometimes hundreds of kilometers from the operating bases. Moreover, if their reserves are divided by quantity it will turn out that there is no commercial value from development to speak of.

In conclusion I would like to quote the deputy minister once more. "For such a geologically complex region as the Timano-Pechora," he writes, "one cannot completely exclude the risk of locating unsuccessful wells in some fields. As analysis indicated, of more than 1,500 wells drilled for the development of the Usinsk and Vozey fields, only 4-6 were unable to produce and were eliminated for geological reasons."

The truth is that geology has always involved risk and always will. But isn't it too great in this case? Here is what the Komineft Association has to say. Both fields have a total of about 50 "empty" wells--those located in the main formation, but which did not yield an oil influx. The fact that many of these wells were used later as injection wells or shifted to other horizons does not change the geological picture. It is strange that these simple truths never occurred even to the chief geologist of the Komineft Association, N. Lisin, who sent Minnefteprom satisfactory and obviously unobjective information after publication of the article.

"This document," N. Kalimullin, chief engineer of the association, replied to my question, "does not reflect our position nor the actual state of affairs."

All these facts speak only of one thing: the unself-critical attitude of the RSFSR Ministry of Geology and the geological staff of the Komineft Association towards their work. But the effort to avoid sharp corners will not help matters.

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OIL AND GAS

SUPERDEEP DRILLING PLANS DISCUSSED

Baku VYSHKA in Russian 23 Nov 84 p 2

[Article by I. Guliyev, senior scientist of the Geology Institute of the Azerbaijan SSR Academy of Sciences and candidate of geological and mineralogical sciences: "Oil and Gas From Low Depths"]

[Text] Despite the rapid growth of new modern sectors (electrotechnology, machinebuilding, instrument building) and corresponding changes in the republic's economic structure, the oil and gas industry remains one of the leading links of Azerbaijan's economy.

However, the development of new oil deposits and stabilization of oil recovery are not occurring as they should. This is associated with insufficient levels of exploratory drilling, a high accident rate during well drilling, abandonment for technical and geological reasons, inadequate study of the geological structure of deeply submerged horizons and the lower structural stages in new promising regions, along with procedural and technological questions associated with exploration of promising areas in Azerbaijan and the Caspian Sea.

How can oil recovery in the republic be stabilized?

In discussing the prospects for the sector's development, scientists and production workers are turning ever more frequently to "the low depths." The low depths have always been considered promising in Azerbaijan. Publications in which scientists have proven more and more insistently the great possibilities of deep-seated deposits have appeared from time to time in special literature and in newspapers. No less impelling are the arguments against deep drilling: degrading of the collector properties of rocks, high temperatures predictable at low depths, technical complexities, etc.

Worldwide prospecting know-how has proven to be a serious "con." Numerous statistical reports on the distribution of deep-seated oil reserves have unanimously affirmed that oil and gas reserves sharply decrease beginning at depths of 2-3 kilometers and deeper. This was also observed for individual fields, giant fields and, finally, for combined oil and gas reserves. Although very large gas deposits occur at great depths (5-7 kilometers), still no more than 2 percent of the world's prospected oil and gas reserves are presently associated with these depths.

The generalization of factual material on 11 well studied deep basins in the USSR and abroad, where more than 10,000 wells with depths exceeding

5 kilometers were drilled, showed that the principal picture of oil and gas resource distribution is not changing--the basic resources in deep basins are concentrated at depths no greater than 4 kilometers.

Moreover, as depth increases, the cost of wells sharply rises, which correspondingly causes an increase in the cost of preparing a unit of reserves and recovery. Thus, the All-Union Oil Geological Prospecting Institute has estimated that it is profitable to prospect at depths exceeding 4.5 kilometers deposits with more than 50 billion cubic meters of formation gas and with a yield of over 600,000 cubic meters per day, that is, the deeper the deposit, the greater reserves it should have in order for its development to be profitable. Practice proves that unit oil and gas reserves essential for a single field decrease with depth.

That is to say that the arguments against oil and gas prospecting at low depths are indeed serious, since practice is the criterion of truth.

All the same, the republic's scientists were optimistic. From time to time articles proving the good possibilities of gas condensate and gas, if not oil, prospecting appeared in the scientific and popular press.

The beginning of the 1980's brought a renewal of interest in the problem, reflected in the scientific literature of the majority of scientific publications (a kind of information explosion) devoted to the oil and gas content of low depths. The leading scientists and production workers of the republic's organizations, such as the Geology Institute of the Azerbaijan SSR Academy of Sciences, the Kaspmorneftegasprom All-Union Production Association, the Southern All-Union Scientific Research Institute of Geophysics [YUZHVNIIgeofizika], the Azerbaijan Institute of Petroleum and Chemistry imeni M. Azizbekov [AzINEFTEKHIM] and others, independently of each other published a series of materials which demonstrated the good prospects of deep horizons on the basis of new factual material.

Azerbaijan scientists presented special information about the possibilities of the oil- and gas-bearing depths of the Southern Caspian basin at the International Geological Congress in Moscow this past August. Under the direction of Academician Sh. Mekhtiyev, the Geology Institute of the Azerbaijan SSR Academy of Sciences is organizing an ongoing seminar "Problems of the Oil and Gas Content of Deep-Seated Deposits," and the YUZHVNIIgeofizika is conducting a special conference on this subject; dissertation themes accent the resources and the phase condition of hydrocarbons in deep-seated deposits.

What caused this "flash of interest," this optimism of scientists and production workers? Towards the end of the 1970's, combined geological, geophysical and geochemical research of the depths yielded a number of fundamentally new facts, chief of which are the following. It was shown by independent methods, such as the study of organic matter, isotope research, and the study of products from mud volcano discharge, that a significant mass of hydrocarbons is generated in the deposits of the Southern Caspian basin at depths exceeding 8-10 kilometers. This conclusion provides the key to prediction of the oil and gas content of low depths. The fact is that the main hydrocarbon reserves in a section coincide approximately with the depths of

hydrocarbon reserves in a section coincide approximately with the depths of their generation. Thus, the main oil reserves in the world's sedimentary basins occur at depths of 1.5 to 3 km; according to modern concepts, oil-generation depths occur at an interval of 3-4 km. Thus, proceeding from these approximate relations, the main oil mass in our region is concentrated at depths exceeding 6 km.

Another important factor is the low heat flow, established on the basis of direct surveys, in the majority of the region's territory. The temperature at depths of 5-6 km on the average does not exceed 110-120 degrees, which is approximately 30-40 degrees lower than temperatures at these same depths in the world's main oil- and gas-bearing basins. If the interior's temperature increases with depth at the same rate as for depths of 6 km, then the so-called "critical depth of oil occurrence" will be reached at depths of no less than 10 km, and considering the young age (in the geological sense) of the deposits, at even greater depths. The latter is very significant. While there was no doubt about the potential gas resources at low depths in our region, still oil resources were always discussed cautiously. Data acquired recently by the Geology Institute of the Azerbaijan SSR Academy of Sciences and other organizations about depths of oil generation, thermodynamic conditions and preservation at low depths of granular reservoirs and clay caps, favorable structural conditions, etc., thus indicate the oil- and gas-bearing potential of the low depths. The key to this optimism is the completely unique structural character, history of development and features of oil and gas formation in the Southern Caspian basin, which is considered exceptional even among sedimentary basins having similar geological conditions.

There are two methods of developing these riches. The first is to proceed from the current rates of development of low depths. Statistical data indicate that the average depth of drilled wells is gradually increasing. The current rate of depth increase of exploratory wells will require massive drilling out of 6-8 km depths toward the end of the century. The second method is accelerated drilling out of low depths with introduction in exploratory work of the drilling know-how of the Kolskaya, Saatlinskaya and other superdeep wells. This method, naturally, requires significant additional capital outlays. However, economic estimates indicate that these expenses will be worthwhile. The success of superdeep drilling is sufficiently high (30-50 percent). This makes superdeep drilling economically effective even when the cost of wells is high.

Large-scale superdeep drilling is taking place around the Caspian Sea basin. It is thought that work on a similar scale should be conducted in Azerbaijan, where the nation's deepest oil and gas deposits are now being exploited.

It is natural that massive drilling out of low depths should encounter substantial geological and technical difficulties. Suffice it to say that in the country as a whole a majority of wells (61 percent) with planned depths of more than 4.5 km were abandoned for technical reasons; only 44 percent of the wells were tested at depths greater than 4.5 km. Moreover, it is apparent that progress in this area is impossible without organization of deep, parametric, prospecting and exploratory drilling combined with geophysical research and review of the institutes' scientific topics with emphasis on prediction of

hydrocarbon reserves in a section coincide approximately with the depths of their generation. Thus, the main oil reserves in the world's sedimentary basins occur at depths of 1.5 to 3 km; according to modern concepts, oil-generation depths occur at an interval of 3-4 km. Thus, proceeding from these approximate relations, the main oil mass in our region is concentrated at depths exceeding 6 km.

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quality, phase state and oil and gas resources at great depths.

Apparently the time has come for the creation of a specialized subdivision for exchange of know-how in the field of superdeep drilling and study of the deep structure of the earth's depths. It is advisable to establish this in Azerbaijan, which has all the necessary conditions: more than a century of oil-prospecting and oil-recovery know-how, drilling of the nation's first deep wells and currently the greatest number of drilled wells (over 500) with depths above 5 km, drilling of the 15-km Saatlinskaya well, and finally, a powerful petroleum machinebuilding base and network of scientific research institutes.

Superdeep drilling is a new branch of science and technology situated at the juncture of the technical, physical-chemical and geological disciplines. As the vanguard of scientific technical progress, it has a strong impact on all aspects of the republic's scientific, technical and economic life. (Suffice it to say that the drilling of the one Saatlinskaya well required the cooperation and collaboration of more than 30 of the nation's scientific research organizations).

The second method meets the current requirements presented by the party and government for development of the national economy on the modern stage--as much production intensification as possible based on introduction of scientific and technical achievements.

There is every reason to believe that forced development of low depths will return Azerbaijan's past glory as one of the nation's leading petroleum republics.

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CSO: 1822/94

PROBLEMS IMPEDE KAZAKH OIL, GAS EXPLORATION

Alma-Ata KAZAKHSTANSKAYA PRAVDA in Russian 20 Oct 84 p 2

[Article by Yu. Vasilyev, Ural Oblast: "Deep Horizons"]

[Excerpts] Karachaganak stands out among the nation's oil- and gas-bearing zones. Here, to the north of the Urals, at the very shore of the Caspian Sea basin, a new gas and condensate field was opened. It surpasses the well-known fields in density of commercial reserves per square meter and potential condensate content per cubic meter of formation gas.

For a very long time the region has attracted the attention of scientists involved in the prospecting of raw materials for power engineering, since the Urals-Emba salt dome oblast has large resources of halurgite and other minerals. Oil and gas prospecting of the depths in this location has been going on for 100 years. The oil- and gas-bearing formations of Western Kazakhstan were difficult to prospect at first because of their extremely complex stratigraphy.

After 20 years of exploratory work many wells were drilled to the 3,000-4,500 meter marks, but they did not bring the expected results. At the same time a number of opened fields with small noncommercial oil and gas resources indicated that prospectors were on the right path. The collective of the Urals Oil and Gas Prospecting Expedition then decided to reexamine the direction of prospecting work and, despite geophysical research data forecasting subsalt horizons at low depths, to begin drilling wells to 5,000 meters.

However, it was easier said than done. The drillers lacked the necessary equipment and there was not much know-how of deep drilling on a nationwide scale. All hope rested on one's own achievements. Methods and skills were gathered like crumbs.

In higher government agencies no one wanted to assume the responsibility of giving permission to drill wells which exceeded their design capacity by one third. The Urals workers took this responsibility on themselves, because they believed in success.

Their magnesium hydrogel based washes, the formulas of which were developed in the expedition, helped hasten penetration. This helped facilitate well construction due to the exclusion of drill string, decrease in well depth, and

reduction in the number of high-density pipes. A rock-crushing tool with an artificial adamantine frame was used successfully in the drilling brigades. This gave a new impetus to penetration in combination with progressive turbine drilling.

In a very short period of 3 years, more than 10 wells with depths ranging from 4,500 to 5,300 meters were drilled in the field. Wells with depths at least to 5,200-5,300 meters are being developed for commercial evaluation of deposits. Wells are being drilled to 5,700 meters to expose oil- and gas-bearing formations. Depths upwards of 6,000 meters are being developed. Generous samples lay one behind the other on the laboratory tables.

The drillers work with enthusiasm, with faith in the final result. They are opening new fields. The Chilik field promises to be rich in mineral content. The native brothers of Karachaganak can name other oil and gas occurrences in the basin, of which the northern shore is opened by the distinctive "golden belt" of the Urals area.

At the same time many problems are created by the complex mining and geological conditions of prospecting work, the extreme depth of pays,[1] and the presence of lost-circulation zones. Also having a negative effect are the ambiguous data of seismic research, especially for selection of well design. Often large-diameter pipes are used in vain to penetrate the depths. This is slow and expensive.

Further exploration of the Karachaganak field is being held back for a number of reasons. Thus, last year the drillers of one brigade sat idle without pay for nearly a month and a half because they had fulfilled the well penetration plan ahead of schedule. How can one account for this? Here's how. It is now common knowledge that the field's pay zone may reach huge proportions: from 600-700 to 1,200 meters. Drillers reached the proposed limit at 5,200 meters, but exploitable layer was still thick. Can one calculate a reserve in this situation? Of course not. One must drill deeper. But money and materials are lacking for deeper penetration. The expedition has no right to solve these problems independently. Thus the Urals workers had to "talk around" the situation first in Akhtyubinsk, then in Alma-Ata and Moscow, at the national and republic ministries of geology--at the higher level, as they say. The paradox is that nature puts its riches into the hands of men, but they cannot take them due to the sluggishness of interested agencies.

There are many annoying patches in the drillers' material and technical outfitting. There are no opened roads to Karachaganak and other fields, but when did geologists ever have them? Pipes, machines, derrick structures, even water for people are all essential for delivery by land transport, particularly by trucks. In spring and autumn the Solonchak steppe is transformed into an impassable bog. Vehicles with higher rough-road performance break down quickly, and they cannot be replaced; new technology is introduced sparingly, as they say--"once a year as expenses allow ["odna v god--podraskhod"]. The expedition's repair base is poor; spare parts arrive irregularly.

At some stage of work, one labor subdivision gemmated from the Urals oil- and gas-prospecting expedition and was transformed into the Northern Caspian Expedition for Sampling and Well Testing. Although the expedition's tasks are now varied, they still continue to work in one team toward a final goal. The testers also have enough troubles. The first and perhaps most important is the lack of motor transport. Drillers in the division gave them what they could. But what could they give? The same semi-collapsing [polupazvalivshchiysya] trucks in which the testers ride all day, but two stand. The specific features of the field's geological structure forced well researchers to seek and use high-thoughput separation units, wellhead equipment designed with a hydrogen-sulfide post, various corrosion inhibitors for flow strings, rising pipes and control and measuring instruments and other uncommon things that will not be delivered immediately. The field continues to "toss up" problems.

This is why prospectors of the Urals depths today are unanimous in the opinion that an independent production association of the Kazakh SSR Ministry of Geology should be established in the oblast, that there should be a current coordinator of all work, a careful manager of natural resources, and that Urals drillers, testers and geophysicists should not bounce among various towns and authorities, shaking down present matters, but that they solve all problems on site. Then the material and technical outfitting of geologists would definitely improve. They would not have to sit idle without pay and be afraid to fulfill plans ahead of schedule.

Such is the requirement of life itself; this is called for by the decisions of the 24th CPSU Congress, anticipating increased development of Western Kazakhstan's natural riches.

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CSO: 1822/94

OIL AND GAS

TURKMEN OFFSHORE OIL RECOVERY TO DOUBLE

Ashkhabad TURKMENSKAYA ISKRA in Russian 17 Oct 84 p 2

[Article by Ya. Bayramov, Director of the Chelekenmorneftegazprom Production Association: "Cheleken's Oil"]

[Excerpts] Turkmenistan's petroleum industry traversed a difficult but glorious path of development. Before the Great October socialist revolution the republic had only one field, Cheleken, where private entrepreneurs in the person of the Nobel Brothers firm were engaged in oil recovery. At the same time, others pumped out oil with them.

During the whole time of their management of Cheleken, they drilled only one well to a depth of 500 meters, which attests to the extremely backward technology and drilling techniques, even for their time. In the race for easy money oil industrialists exploited the fields unsystematically, without prospecting and exploration, violating the most elementary rules.

A technical carbon plant was built for full utilization of gas recovered in Cheleken. Our drillers drilled more than 50,000 linear meters of wells for iodobromine water for the chemical plant. The plant was built for the purpose of using formation water recovered as a by-product of oil for processing of iodine, bromine and other chemical products.

In recent years exploratory geophysics has discovered and prepared by deep drilling a multitude of highly promising structures in the western continuation of the tectonic zone and in the confines of the Eastern Caspian stage, which includes the shallow waters off the southeastern coast of Turkmen Bay to Iranian territorial waters.

Every year the proportion of offshore oil increases. The Ministry of the Gas Industry, jointly with the Kaspmorneftegazprom All-Union Production Association and the Chelekenmorneftegazprom Production Association, developed and is implementing a number of organizational and technical measures aimed at increasing the volume of exploratory as well as development drilling for offshore oil.

In order to decrease the design depths of development wells, the productive section was divided into a number of stages to be drilled out by stage, which will considerably speed up the penetration of wells. New highly effective drilling and recovery methods will be introduced. For example, floating and

semi-submersible drilling rigs will be used widely in the prospecting of new oil and gas fields. All this will make it possible to more than double offshore oil recovery in the 12th Five-Year Plan.

The association's collective is prepared to resolve the complex tasks of 1985 and the next five-year plan. With these aims, prospecting in the Caspian Sea is expanding, the volumes of offshore field construction are increasing, and the working and living conditions of oil workers are improving.

This year the association is starting to build a worker's on-duty village for 168 people and a mechanics workshop for drilling. In 1985 construction will begin on the base of the Cheleken offshore directorate of exploratory drilling, a school accommodating 1,174 students, and a dormitory accommodating 400 people. Thus, our successes are only the beginning of a huge amount of work.

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OIL AND GAS

AZERBAIJAN SSR OIL, GAS PRODUCTION PLAN FULFILLMENT FOR JAN 84

Baku VYSHKA in Russian 9 Feb 84 p 1

[Monthly listing of production plan fulfillment by the PO [Production Organization] and the NGDU [Oil and Gas Producing Administrations] subordinate to the Ob"yedineniye Azneft [State Association of the Azerbaijan Petroleum Industry] and the VPO Kaspmorneftegazprom [Caspian Sea Petroleum and Gas Industry All-Union Production Association] published under the heading: "Oil and Gas: How production is going"]

[Text] Data from TsSU [Central Statistical Administration] of the Azerbaijan SSR on Oil and Gas Production Plan Fulfillment for January 1984

(In percent of plan)

	Oil prod.	Gas prod.
Azneft Association	94.3	100.4
NGDU Leninneft' (chief, Cmrd. R. Vezirov, secrtry. party org., Cmrd E. Makhmudov)	100.0	100.4
NGDU imeni 26 Baku Commissars (Cmrds. A. Bagiyev, Ch. Mustafeyev)	100.0	103.7
NGDU Ordzhonikidzeneft' (Cmrds. Z. Tagiyev, R. Ragimov)	100.0	106.4
NGDU Karadagneft' (Cmrds. K. Kerimov, Z. Abasov)	100.3	100.5
NGDU Kirovneft' (Cmrds. T. Mamedov, I. Ibragimov)	86.9	101.9
NGDU Azizbekovneft' (Cmrds. T. Gasanov, A. Barbanly)	100.0	100.9
NGDU Siazanneft' (Cmrds. M. Musayev, A. Mezhidov)	95.4	100.1
NGDU Shirvanneft' (Cmrds. V. Mamedov, Z. Geydarov)	93.1	100.3
NGDU Sal'yanyneft' (Cmrds. F. Guseynov, G. Gasanov)	100.0	100.2

(In percent of plan)

	Oil prod.	Gas prod.
Azneft Association (continued)		
NGDU Neftechalaneft' (Cmrds. S. Mamedov, I. Dzhafarov)	74.5	104.2
NGDU Muradkhanlyneft' (Cmrds. S. Mudarov, I. Babayev)	27.3	26.2
Kaspmorneftegazprom VPO	100.6	100.3
PO imeni 22nd CPSU Congress (Cmrds. S. Ibragimov, N. Zaydov)	103.9	100.0
NGDU Artemneftegaz (Cmrds. B. Khalilov, T. Azizov)	102.8	115.0
NGDU imeni Serebrovskiy (Cmrds. F. Musayev, V. Alekperov)	86.1	103.4
NGDU imeni N. Narimanov (Cmrds. G. Gumbatov, Z. Mamedov)	106.2	101.9
NGDU imeni 50-years of the USSR (Cmrds. B. Mamedov, B. Mirzabekov)	81.4	94.8
Altogether for the associations	98.5	100.3

According to the results for January 1984, the Azneft Association, as compared with the plan, underproduced by 20,400 tons of oil. The arrears for each of the oil and gas producing administrations were: Muradkhanlyneft' - 8,300 tons, Shirvanneft" - 5,600 tons, Kirovneft' - 3,900 tons, Neftechalaneft' - 1,900 tons, Siazanneft" - 800 tons. The NGDU Muradkhanlyneft' also did not fulfill the plan for the production of gas, underproducing by 450,000 cubic meters.

In the Kaspmorneftegaz VPO, the NGDUs imeni Serebrovskiy and imeni 50-years of the USSR, as compared with the plan, underproduced oil by 15,400 tons. The NGDU imeni 50-years of the USSR did not fulfill the plan for gas production, underproducing by 20 million cubic meters.

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CSO: 1822/108

OIL AND GAS

AZERBAIJAN SSR OIL, GAS PRODUCTION PLAN FULFILLMENT FOR JAN-FEB 84

Baku VYSHKA in Russian 8 Mar 84 p 3

[Monthly listing of production plan fulfillment by the PO [Production Organization] and the NGDU [Oil and Gas Producing Administrations] subordinate to the Ob"yedineniye Azneft [State Association of the Azerbaijan Petroleum Industry] and the VPO Kaspmorneftegazprom [Caspian Sea Petroleum and Gas Industry All-Union Production Association] published under the heading: "Oil and Gas: How production is going"]

[Text] Data from TsSU [Central Statistical Administration] of the Azerbaijan SSR on Oil and Gas Production Plan Fulfillment for January-February 1984

(In percent of plan)

	February		Jan-Feb	
	Oil prod.	Gas prod.	Oil prod.	Gas prod.
Azneft Association	88.5	94.2	91.5	97.4
NGDU Leninneft' (chief, Cmrd. R. Vezirov, secrtry. party org., Cmrd E. Makhmudov)	88.8	102.1	94.6	101.2
NGDU imeni 26 Baku Commissars (Cmrds. A. Bagiyev, Ch. Mustafeyev)	100.0	105.6	100.0	104.6
NGDU Ordzhonikidzeneft' (Cmrds. Z. Tagiyev, R. Ragimov)	86.3	106.5	94.3	106.5
NGDU Karadagneft' (Cmrds. K. Kerimov, Z. Abasov)	100.1	101.0	100.2	100.7
NGDU Kirovneft' (Cmrds. T. Mamedov, I. Ibragimov)	90.9	103.1	88.9	102.5
NGDU Azizbekovneft' (Cmrds. T. Gasanov, A. Barbanly)	79.9	134.2	90.3	114.7
NGDU Siazanneft' (Cmrds. M. Musayev, A. Mezhidov)	86.5	71.7	91.1	86.4
NGDU Shirvanneft' (Cmrds. V. Mamedov, Z. Geydarov)	91.3	81.6	92.2	91.2
NGDU Sal'yanyneft' (Cmrds. F. Guseynov, G. Gasanov)	88.7	100.4	94.6	100.3

(In percent of plan)

	February		Jan-Feb	
	Oil prod.	Gas prod.	Oil prod.	Gas prod.
Azneft Association (continued)				
NGDU Neftechalaneft' (Cmrds. S. Mamedov, I. Dzhafarov)	95.5	100.9	84.6	102.5
NGDU Muradkhanlyneft' (Cmrds. S. Mudarov, I. Babayev)	21.8	21.9	24.6	24.1
Kaspmorneftegazprom VPO	95.4	100.4	98.1	100.3
PO imeni 22nd CPSU Congress (Cmrds. S. Ibragimov, N. Zaydov)	100.0	100.0	102.0	100.0
NGDU Artemneftegaz (Cmrds. B. Khalilov, T. Azizov)	84.7	113.1	94.1	114.1
NGDU imeni Serebrovskiy (Cmrds. F. Musayev, V. Alekperov)	100.0	104.5	92.8	103.9
NGDU imeni N. Narimanov (Cmrds. G. Gumbatov, Z. Mamedov)	88.5	101.9	97.6	101.9
NGDU "Bulla-more" imeni 50-years of the USSR (Cmrds. B. Mamedov, B. Mirzabekov)	85.3	93.6	83.3	94.2
Altogether for the associations	93.2	100.1	95.9	100.2

According to the results for January-February 1984, the Azneft Association underproduced, compared with the plan, by 58,700 tons of oil and 3.2 million cubic meters of gas. The Oil and Gas Producing Administrations Siazanneft', Shirvanneft', and Muradkhanlyneft' did not fulfill the plan for production of gas, being in arrears more than 5 million cubic meters.

Since the beginning of the year the Kaspmorneftegaz VPO has underproduced compared to the plan by 27,900 tons of oil. The Oil and Gas Producing Administrations Artemneftegaz, imeni Serebrovskiy, imeni Narimanov and imeni 50-years of the USSR are in arrears compared with the plan by a total of 46,900 tons of oil. The NGDU imeni 50-years of the USSR also has not fulfilled the gas production plan, compared with which, it has underproduced by 42.8 million cubic meters.

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CSO: 1822/ 108

OIL AND GAS

AZERBAIJAN SSR OIL, GAS PRODUCTION PLAN FULFILLMENT FOR 1ST QUARTER OF 1984

Baku VYSHKA in Russian 7 Apr 84 p 1

[Monthly listing of production plan fulfillment by the PO [Production Organization] and the NGDU [Oil and Gas Producing Administrations] subordinate to the Ob"yedineniye Azneft [State Association of the Azerbaijan Petroleum Industry] and the VPO Kaspmorneftegazprom [Caspian Sea Petroleum and Gas Industry All-Union Production Association] published under the heading: "Oil and Gas: How production is going"]

[Text] Data from TsSU [Central Statistical Administration] of the Azerbaijan SSR on Oil and Gas Production Plan Fulfillment for 1st Quarter 1984

(In percent of plan)

	March		1st Qtr.	
	Oil prod.	Gas prod.	Oil prod.	Gas prod.
Azneft Association	96.6	106.3	93.2	100.4
NGDU Leninneft' (chief, Cmrd. R. Vezirov, secrtry. party org., Cmrd E. Makhmudov)	92.8	100.5	94.0	101.0
NGDU imeni 26 Baku Commissars (Cmrds. A. Bagiyev, Ch. Mustafayev)	100.1	103.3	100.0	104.2
NGDU Ordzhonikidzeneft' (Cmrds. Z. Tagiyev, R. Ragimov)	100.0	108.4	96.3	107.1
NGDU Karadagneft' (Cmrds. K. Kerimov, Z. Abasov)	100.4	105.1	100.2	102.2
NGDU Kirovneft' (Cmrds. T. Mamedov, I. Ibragimov)	100.2	104.9	92.7	103.3
NGDU Azizbekovneft' (Cmrds. T. Gasanov, A. Barbanly)	92.2	158.6	90.9	128.2
NGDU Siazanneft' (Cmrds. M. Musayev, A. Mezhidov)	89.6	89.6	90.6	87.5
NGDU Shirvanneft' (Cmrds. V. Mamedov, Z. Geydarov)	100.1	100.7	94.9	94.4
NGDU Sal'yanyneft' (Cmrds. F. Guseynov, G. Gasanov)	100.0	118.2	96.4	106.4

(In percent of plan)

	March		1st Qtr.	
	Oil prod.	Gas prod.	Oil prod.	Gas prod.
Azneft Association (continued)				
NGDU Neftechalaneft' (Cmrds. S. Mamedov, I. Dzhafarov)	101.4	100.5	90.3	101.8
NGDU Muradkhanlyneft' (Cmrds. S. Mudarov, I. Babayev)	68.2	100.0	39.6	49.8
Kaspmorneftegazprom VPO	101.2	101.6	99.1	100.8
PO imeni 22nd CPSU Congress (Cmrds. S. Ibragimov, N. Zaydov)	101.5	100.0	101.9	100.0
NGDU Artemneftegaz (Cmrds. B. Khalilov, T. Azizov)	100.0	111.0	96.1	113.0
NGDU imeni Serebrovskiy (Cmrds. F. Musayev, V. Alekperov)	100.0	105.3	95.2	104.4
NGDU imeni N. Narimanov (Cmrds. G. Gumbatov, Z. Mamedov)	104.8	105.0	100.1	102.9
NGDU "Bulla-more" imeni 50-years of the USSR (Cmrds. B. Mamedov, B. Mirzabekov)	84.5	94.0	83.7	94.1
Altogether for the associations	99.7	101.8	97.2	100.7

According to the results for January - March 1984, the Azneft Association, compared with the plan for oil production, underproduced by 70,800 tons. The NGDUs Siazanneft', Shirvanneft', and Muradkhanlyneft' did not fulfill the gas production plan, being in arrears by 5.9 million cubic meters.

Since the beginning of the year, the Kaspmorneftegaz VPO has underproduced compared with the plan for oil production by 19,200 tons. The oil and gas producing administrations Artemneftegaz, imeni Serebrovskiy, and imeni 50-years of the USSR are in arrears to the oil production plan by 48,800 tons. The NGDU imeni 50-years of the USSR also has not fulfilled the gas production plan, compared with which it has underproduced by about 66 million cubic meters.

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CSO: 1822/108

OIL AND GAS

AZERBAIJAN SSR OIL, GAS PRODUCTION PLAN FULFILLMENT FOR JAN-APR 84

Baku VYSHKA in Russian 9 May 84 p 2

[Monthly listing of production plan fulfillment by the PO [Production Organization] and the NGDU [Oil and Gas Producing Administrations] subordinate to the Ob"yedineniye Azneft [State Association of the Azerbaijan Petroleum Industry] and the VPO Kaspmorneftegazprom [Caspian Sea Petroleum and Gas Industry All-Union Production Association] published under the heading: "Oil and Gas: How production is going"]

[Text] Data from TsSU [Central Statistical Administration] of the Azerbaijan SSR on Oil and Gas Production Plan Fulfillment for January through April

(In percent of plan)

	April		Jan-Apr	
	Oil prod.	Gas prod.	Oil prod.	Gas prod.
Azneft Association	100.9	113.6	95.1	103.6
NGDU Leninneft' (chief, Cmrd. R. Vezirov, secrtry. party org., Cmrd E. Makhmudov)	100.0	100.4	95.5	100.8
NGDU imeni 26 Baku Commissars (Cmrds. A. Bagiyev, Ch. Mustafeyev)	100.3	103.5	100.1	104.0
NGDU Ordzhonikidzeneft' (Cmrds. Z. Tagiyev, R. Ragimov)	100.0	114.4	97.2	108.8
NGDU Karadagneft' (Cmrds. K. Kerimov, Z. Abasov)	100.3	105.1	100.3	103.0
NGDU Kirovneft' (Cmrds. T. Mamedov, I. Ibragimov)	100.7	107.0	94.7	104.2
NGDU Azizbekovneft' (Cmrds. T. Gasanov, A. Barbanly)	102.3	172.1	93.8	137.3
NGDU Siazanneft' (Cmrds. M. Musayev, A. Mezhidov)	100.0	100.0	92.9	90.4
NGDU Shirvanneft' (Cmrds. V. Mamedov, Z. Geydarov)	100.3	117.7	96.2	100.1
NGDU Sal'yanyneft' (Cmrds. F. Guseynov, G. Gasanov)	10[illegible].6	123.4	98.4	110.6

(In percent of plan)

	April		Jan-Apr	
	Oil prod.	Gas prod.	Oil prod.	Gas prod.
Azneft Association (continued)				
NGDU Neftechalaneft' (Cmrds. S. Mamedov, I. Dzhafarov)	101.6	130.0	93.1	106.4
NGDU Muradkhanlyneft' (Cmrds. S. Mudarov, I. Babayev)	101.8	100.0	58.0	60.0
Kaspmorneftegazprom VPO	101.6	105.0	99.7	101.8
PO imeni 22nd CPSU Congress (Cmrds. S. Ibragimov, N. Zaydov)	100.1	100.0	101.4	100.0
NGDU Artemneftegaz (Cmrds. B. Khalilov, T. Azizov)	103.1	110.0	97.8	112.3
NGDU imeni Serebrovskiy (Cmrds. F. Musayev, V. Alekperov)	100.0	107.8	96.4	105.2
NGDU imeni N. Narimanov (Cmrds. G. Gumbatov, Z. Mamedov)	104.3	102.6	101.1	102.8
NGDU imeni 50-years of the USSR (Cmrds. B. Mamedov, B. Mirzabekov)	100.9	102.1	87.5	95.9
Altogether for the associations	101.4	105.5	98.2	101.9

According to the results for January through April, the Azneft Association has underproduced the oil production plan by tens of thousands of tons. The NGDUs Siazanneft' and Muradkhanlyneft' have not fulfilled the gas production plan, being in arrears by 4.1 million cubic meters.

Since the beginning of the year the Kaspmorneftegaz VPO has underproduced by 7,900 tons compared with the oil production plan. The oil and gas producing administrations Artemneftegaz, imeni Serebrovskiy, and imeni 50-years of the USSR have become in arrears to the oil production plan by a total of 47,300 tons. The NGDU imeni 50-years of the USSR also has not fulfilled the plan for gas production having underproduced by 58.8 million cubic meters.

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OIL AND GAS

AZERBAIJAN SSR OIL, GAS PRODUCTION PLAN FULFILLMENT FOR JAN-MAY 84

Baku VYSHKA in Russian 7 Jun 84 p 1

[Monthly listing of production plan fulfillment by the PO [Production Organization] and the NGDU [Oil and Gas Producing Administrations] subordinate to the Ob"yedineniye Azneft [State Association of the Azerbaijan Petroleum Industry] and the VPO Kaspmorneftegazprom [Caspian Sea Petroleum and Gas Industry All-Union Production Association] published under the heading: "Oil and Gas: How production is going"]

[Text] Data from TsSU [Central Statistical Administration] of the Azerbaijan SSR on Oil and Gas Production Plan Fulfillment for January through May

(In percent of plan)

	May		Jan-May	
	Oil prod.	Gas prod.	Oil prod.	Gas prod.
Azneft Association	100.1	106.4	96.2	104.1
NGDU Leninneft' (chief, Cmrd. R. Vezirov, secrtry. party org., Cmrd E. Makhmudov)	100.0	100.3	96.4	100.7
NGDU imeni 26 Baku Commissars (Cmrds. A. Bagiyev, Ch. Mustafeyev)	100.2	102.8	100.1	103.7
NGDU Ordzhonikidzeneft' (Cmrds. Z. Tagiyev, R. Ragimov)	105.5	113.8	98.9	109.8
NGDU Karadagneft' (Cmrds. K. Kerimov, Z. Abasov)	100.3	104.1	100.3	103.2
NGDU Kirovneft' (Cmrds. T. Mamedov, I. Ibragimov)	110.1	102.6	97.8	103.9
NGDU Azizbekovneft' (Cmrds. T. Gasanov, A. Barbanly)	110.0	191.8	97.1	146.7
NGDU Siazanneft' (Cmrds. M. Musayev, A. Mezhidov)	93.1	76.5	93.0	87.7
NGDU Shirvanneft' (Cmrds. V. Mamedov, Z. Geydarov)	101.2	108.0	97.2	101.7
NGDU Sal'yanyneft' (Cmrds. F. Guseynov, G. Gasanov)	106.2	118.3	100.0	112.1

(In percent of plan)

	May		Jan-May	
	Oil prod.	Gas prod.	Oil prod.	Gas prod.
Azneft Association (continued)				
NGDU Neftechalaneft' (Cmrds. S. Mamedov, I. Dzhafarov)	113.7	117.6	97.3	108.1
NGDU Muradkhanlyneft' (Cmrds. S. Mudarov, I. Babayev)	47.6	47.9	55.2	57.9
Kaspmorneftegazprom VPO	101.4	104.0	100.1	102.2
PO imeni 22nd CPSU Congress (Cmrds. S. Ibragimov, N. Zaydov)	101.5	100.0	101.4	100.0
NGDU Artemneftegaz (Cmrds. B. Khalilov, T. Azizov)	103.0	109.7	98.8	111.8
NGDU imeni Serebrovskiy (Cmrds. F. Musayev, V. Alekperov)	100.0	107.1	97.1	105.6
NGDU imeni N. Narimanov (Cmrds. G. Gumbatov, Z. Mamedov)	101.1	101.6	101.1	102.6
NGDU imeni 50-years of the USSR (Cmrds. B. Mamedov, B. Mirzabekov)	100.0	100.4	89.9	96.9
Altogether for the associations	100.9	104.1	98.8	102.3

According to the results for January through May 1984, the Azneft Association underproduced compared with the oil production plan by 67,500 tons. The oil and gas producing administrations Siazanneft' and Muradkhanlyneft' did not fulfill the gas production plan, being in arrears by 6.2 million cubic meters.

For the Kaspmorneftegaz VPO, the oil and gas producing administrations Artemneftegaz, imeni Serebrovskiy, and imeni 50-years of the USSR which are in arrears by a total of 46,300 tons, have not coped with the oil production plan since the beginning of the year. The NGDU imeni 50-years of the USSR also has not fulfilled the gas production plan compared with which it has underproduced by 57.2 million cubic meters.

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OIL AND GAS

AZERBAIJAN SSR OIL, GAS PRODUCTION PLAN FULFILLMENT FOR 1ST HALF OF 1984

Baku VYSHKA in Russian 7 Jul 84 p 2

[Monthly listing of production plan fulfillment by the PO [Production Organization] and the NGDU [Oil and Gas Producing Administrations] subordinate to the Ob"yedineniye Azneft [State Association of the Azerbaijan Petroleum Industry] and the VPO Kaspmorneftegazprom [Caspian Sea Petroleum and Gas Industry All-Union Production Association] published under the heading: "Oil and Gas: How production is going"]

[Text] Data from TsSU [Central Statistical Administration] of the Azerbaijan SSR on Oil and Gas Production Plan Fulfillment for 1st Half of 1984

(In percent of plan)

	June		1st Half of 1984	
	Oil prod.	Gas prod.	Oil prod.	Gas prod.
Azneft Association	100.6	102.5	96.9	103.9
NGDU Leninneft' (chief, Cmrd. R. Vezirov, secrtry. party org., Cmrd E. Makhmudov)	100.0	100.4	97.0	100.7
NGDU imeni 26 Baku Commissars (Cmrds. A. Bagiyev, Ch. Mustafeyev)	103.3	101.3	100.7	103.4
NGDU Ordzhonikidzeneft' (Cmrds. Z. Tagiyev, R. Ragimov)	105.7	113.6	100.0	110.4
NGDU Karadagneft' (Cmrds. K. Kerimov, Z. Abasov)	101.1	104.2	100.4	103.4
NGDU Kirovneft' (Cmrds. T. Mamedov, I. Ibragimov)	111.6	105.7	100.1	104.2
NGDU Azizbekovneft' (Cmrds. T. Gasanov, A. Barbanly)	114.9	158.9	100.0	148.5
NGDU Siazanneft' (Cmrds. M. Musayev, A. Mezhidov)	91.1	78.8	92.6	86.3
NGDU Shirvanneft' (Cmrds. V. Mamedov, Z. Geydarov)	103.9	105.9	98.3	102.4
NGDU Sal'yanyneft' (Cmrds. F. Guseynov, G. Gasanov)	107.9	105.3	101.3	111.1

	(In percent of plan)			
	June		1st Half of 1984	
	Oil prod.	Gas prod.	Oil prod.	Gas prod.
Azneft Association (continued)				
NGDU Neftechalaneft' (Cmrds. S. Mamedov, I. Dzhafarov)	113.5	117.8	100.0	109.3
NGDU Muradkhanlyneft' (Cmrds. S. Mudarov, I. Babayev)	38.4	43.5	51.3	55.8
Kaspmorneftegazprom VPO	101.2	104.6	100.2	102.6
PO imeni 22nd CPSU Congress (Cmrds. S. Ibragimov, N. Zaydov)	103.0	100.0	101.7	100.0
NGDU Artemneftegaz (Cmrds. B. Khalilov, T. Azizov)	106.4	112.5	100.0	111.9
NGDU imeni Serebrovskiy (Cmrds. F. Musayev, V. Alekperov)	94.2	107.9	96.6	106.0
NGDU imeni N. Narimanov (Cmrds. G. Gumbatov, Z. Mamedov)	100.0	102.5	100.9	102.6
NGDU imeni 50-years of the USSR (Cmrds. B. Mamedov, B. Mirzabekov)	100.0	100.5	91.5	97.4
Altogether for the associations	101.0	104.5	99.2	102.7

According to the results for the first half of 1984, the Azneft Association, by tens of thousands of tons,has underproduced the plan for oil production. The oil and gas producing administrations Leninneft', Siazanneft', Shirvanneft', and Muradkhanlyneft'are in arrears to the plan by a total of 70,000 tons. The NGDUs Siazanneft' and Muradkhanlyneft' have not fulfilled the plan for gas production, being in arrears by 8.2 million cubic meters.

For the Kaspmorneftegaz VPO, the oil and gas producing administrations imeni Serebrovskiy and imeni 50-years of the USSR which are in arrears a total of 49,300 tons, have not coped with the oil production plan since the beginning of the year. The NGDU imeni 50-years of the USSR also has not fulfilled the gas production plan, compared with which it underproduced by 55.4 million cubic meters.

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OIL AND GAS

AZERBAIJAN SSR OIL, GAS PRODUCTION PLAN FULFILLMENT FOR JAN-JUL 84

Baku VYSHKA in Russian 10 Aug 84 p 1

[Monthly listing of production plan fulfillment by the PO [Production Organization] and the NGDU [Oil and Gas Producing Administrations] subordinate to the Ob"yedineniye Azneft [State Association of the Azerbaijan Petroleum Industry] and the VPO Kaspmorneftegazprom [Caspian Sea Petroleum and Gas Industry All-Union Production Association] published under the heading: "Oil and Gas: How production is going"]

[Text] Data from TsSU [Central Statistical Administration] of the Azerbaijan SSR on Oil and Gas Production Plan Fulfillment for January through July

(In percent of plan)

	July		Jan-Jul	
	Oil prod.	Gas prod.	Oil prod.	Gas prod.
Azneft Association	96.3	101.9	96.8	103.6
NGDU Leninneft' (chief, Cmrd. R. Vezirov, secrtry. party org., Cmrd E. Makhmudov)	100.0	100.5	97.4	100.6
NGDU imeni 26 Baku Commissars (Cmrds. A. Bagiyev, Ch. Mustafeyev)	100.0	101.3	100.6	103.0
NGDU Ordzhonikidzeneft' (Cmrds. Z. Tagiyev, R. Ragimov)	100.4	112.8	100.1	110.7
NGDU Karadagneft' (Cmrds. K. Kerimov, Z. Abasov)	100.4	105.8	100.4	103.7
NGDU Kirovneft' (Cmrds. T. Mamedov, I. Ibragimov)	101.0	107.4	100.2	104.6
NGDU Azizbekovneft' (Cmrds. T. Gasanov, A. Barbanly)	100.0	156.6	100.0	149.6
NGDU Siazanneft' (Cmrds. M. Musayev, A. Mezhidov)	89.6	76.6	92.2	84.9
NGDU Shirvanneft' (Cmrds. V. Mamedov, Z. Geydarov)	100.0	103.8	98.6	102.6
NGDU Sal'yanyneft' (Cmrds. F. Guseynov, G. Gasanov)	101.8	103.3	101.4	110.1

(In percent of plan)

	July		Jan-Jul	
	Oil prod.	Gas prod.	Oil prod.	Gas prod.
Azneft Association (continued)				
NGDU Neftechalaneft' (Cmrds. S. Mamedov, I. Dzhafarov)	100.9	111.4	100.1	109.5
NGDU Muradkhanlyneft' (Cmrds. S. Mudarov, I. Babayev)	37.1	100.0	48.6	61.5
Kaspmorneftegazprom VPO	101.0	101.6	100.4	102.5
PO imeni 22nd CPSU Congress (Cmrds. S. Ibragimov, N. Zaydov)	102.1	100.0	101.7	100.0
NGDU Artemneftegaz (Cmrds. B. Khalilov, T. Azizov)	103.1	113.2	100.4	112.1
NGDU imeni Serebrovskiy (Cmrds. F. Musayev, V. Alekperov)	95.5	105.7	96.5	105.9
NGDU imeni N. Narimanov (Cmrds. G. Gumbatov, Z. Mamedov)	101.4	100.8	101.0	102.3
NGDU Bulla-more imeni 50-years of the USSR (Cmrds. B. Mamedov, B. Mirzabekov)	100.0	95.2	92.5	97.1
Altogether for the associations	99.5	101.6	99.2	102.5

According to the results for January through July 1984, compared to the plan for oil production, the Azneft Association has underproduced tens of thousands of tons. The oil and gas producing administrations Leninneft', Siazanneft', Shirvanneft', and Muradkhnlyneft' are indebted to the plan by a total of 84,700 tons of oil. The NGDUs Siazanneft' and Muradkhanlyneft' have not fulfilled the plan for gas production, being arrears more then 10 million cubic meters.

For the Kaspmorneftegaz VPO, the oil and gas producing administrations imeni Serebrovskiy, and imeni 50-years of the USSR which are in arrears by a total of 53,300 tons, have not coped with the plan for oil production since the beginning of the year. The NGDU imeni 50-years of the USSR also has not fulfilled the gas production plan, compared to which, it has underproduced by 73.1 million cubic meters.

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OIL AND GAS

AZERBAIJAN SSR OIL, GAS PRODUCTION PLAN FULFILLMENT FOR JAN-SEP 84

Baku VYSHKA in Russian 7 Oct 84 p 2

[Monthly listing of production plan fulfillment by the PO [Production Organization] and the NGDU [Oil and Gas Producing Administrations] subordinate to the Ob"yedineniye Azneft [State Association of the Azerbaijan Petroleum Industry] and the VPO Kaspmorneftegazprom [Caspian Sea Petroleum and Gas Industry All-Union Production Association] published under the heading: "Oil and Gas: How production is going"]

[Text] Data from TsSU [Central Statistical Administration] of the Azerbaijan SSR on Oil and Gas Production Plan Fulfillment for January through September

(In percent of plan)

	Sept		Jan-Sept	
	Oil prod.	Gas prod.	Oil prod.	Gas prod.
Azneft Association	96.2	102.8	96.7	103.3
NGDU Leninneft' (chief, Cmrd. R. Vezirov, secrtry. party org., Cmrd E. Makhmudov)	100.0	100.6	98.0	100.6
NGDU imeni 26 Baku Commissars (Cmrds. A. Bagiyev, Ch. Mustafeyev)	100.0	101.4	100.4	102.7
NGDU Ordzhonikidzeneft' (Cmrds. Z. Tagiyev, R. Ragimov)	100.3	111.5	100.2	111.0
NGDU Karadagneft' (Cmrds. K. Kerimov, Z. Abasov)	100.9	102.3	100.5	103.6
NGDU Kirovneft' (Cmrds. T. Mamedov, I. Ibragimov)	100.3	103.8	100.2	104.2
NGDU Azizbekovneft' (Cmrds. T. Gasanov, A. Barbanly)	102.3	155.8	100.3	151.6
NGDU Siazanneft' (Cmrds. M. Musayev, A. Mezhidov)	81.2	82.7	90.1	83.5
NGDU Shirvanneft' (Cmrds. V. Mamedov, Z. Geydarov)	100.0	104.7	98.5	103.1
NGDU Sal'yanyneft' (Cmrds. F. Guseynov, G. Gasanov)	100.3	106.2	101.1	109.3

(In percent of plan)

	Sept		Jan/Sept	
	Oil prod.	Gas prod.	Oil prod.	Gas prod.
Azneft Association (continued)				
NGDU Neftechalaneft' (Cmrds. S. Mamedov, I. Dzhafarov)	100.7	115.6	100.2	109.5
NGDU Muradkhanlyneft' (Cmrds. S. Mujarov, I. Babayev)	43.1	100.0	49.1	69.3
Kaspmorneftegazprom VPO	103.2	102.3	100.9	107.4
PO imeni 22nd CPSU Congress (Cmrds. S. Ibragimov, N. Zaydov)	105.3	100.0	102.5	100.0
NGDU Artemneftegaz (Cmrds. B. Khalilov, T. Azizov)	100.0	113.2	100.3	112.5
NGDU imeni Serebrovskiy (Cmrds. F. Musayev, V. Alekperov)	100.6	104.2	96.8	105.6
NGDU imeni N. Narimanov (Cmrds. G. Gumbatov, Z. Mamedov)	101.7	99.5	101.1	102.0
NGDU Bulla-more imeni 50-years of the USSR (Cmrds. B. Mamedov, B. Mirzabekov)	100.0	100.1	94.0	97.2
Altogether for the associations	100.9	102.3	99.5	102.4

According to the totals for the nine months, the Kaspmorneftegaz VPO achieved good results. The plans for the production of oil and gas were fulfilled and supplementarily, 10,000 tons of high quality oilwere turned over to refining. The deposit imeni 28 April, where a number of high yield wells were introduced into exploitation, is being successfully assimilated. It is the duty of the marine oilmen to develop in every possible way the scheduled positive improvements and to futher expand the production of oil and to provide for fulfillment of assignments by all collectives.

The Azneft Association, as before, is operating unsatisfactorily. The managers of the association, despite repeated protestations, have not restructured their work, have not taken the necessary steps for output at the planned indicators or for making up the arrears that have built up in the production of oil. Almost half of the oil and gas producing administrations of the association have not fulfilled assignments. Because of a low organization of operations, untimely solution for matters of the material and technical provisions, the large potential resources of the new Tarsdallyar deposit are all the more weakly being realized.

It is necessary that decisive measures be taken in the shortest possible time by the managers of the association and of the oil and gas producing administrations, by the party committees at the sites, and by the primary party organizations to eliminate the deficiencies and fulfill the established plans.

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AZERBAIJAN SSR OIL, GAS PRODUCTION PLAN FULFILLMENT FOR JAN-OCT 84

Baku VYSHKA in Russian 10 Nov 84 p 2

[Monthly listing of production plan fulfillment by the PO [Production Organization] and the NGDU [Oil and Gas Producing Administrations] subordinate to the Ob"yedineniye Azneft [State Association of the Azerbaijan Petroleum Industry] and the VPO Kaspmorneftegazprom [Caspian Sea Petroleum and Gas Industry All-Union Production Association] published under the heading: "Oil and Gas: How production is going"]

[Text] Data from TsSU [Central Statistical Administration] of the Azerbaijan SSR on Oil and Gas Production Plan Fulfillment for January through October

(In percent of plan)

	Oct		Jan-Oct	
	Oil prod.	Gas prod.	Oil prod.	Gas prod.
Azneft Association	96.2	105.6	96.6	103.6
NGDU Leninneft' (chief, Cmrd. R. Vezirov, secrtry. party org., Cmrd E. Makhmudov)	100.0	100.5	98.2	100.6
NGDU imeni 26 Baku Commissars (Cmrds. A. Bagiyev, Ch. Mustafeyev)	100.0	101.3	100.4	102.5
NGDU Ordzhonikidzeneft' (Cmrds. Z. Tagiyev, R. Ragimov)	100.1	111.3	100.2	111.0
NGDU Karadagneft' (Cmrds. K. Kerimov, Z. Abasov)	101.1	104.8	100.5	103.7
NGDU Kirovneft' (Cmrds. T. Mamedov, I. Ibragimov)	100.3	112.3	100.2	105.0
NGDU Azizbekovneft' (Cmrds. T. Gasanov, A. Barbanly)	100.0	193.6	100.2	155.6
NGDU Siazanneft' (Cmrds. M. Musayev, A. Mezhidov)	85.6	101.6	89.6	85.3
NGDU Shirvanneft' (Cmrds. V. Mamedov, Z. Geydarov)	100.1	105.1	98.6	103.3
NGDU Sal'yanyneft' (Cmrds. F. Guseynov, G. Gasanov)	100.1	101.9	101.1	108.6

(In percent of plan)

	Oct		Jan-Oct	
	Oil prod.	Gas prod.	Oil prod.	Gas prod.
Azneft Association (continued)				
NGDU Neftechalaneft' (Cmrds. S. Mamedov, I. Dzhafarov)	100.0	101.8	100.2	109.0
NGDU Muradkhanlyneft' (Cmrds. S. Mudarov, I. Babayev)	43.0	100.0	48.4	72.1
Kaspmorneftegazprom VPO	102.7	100.5	101.1	102.2
PO imeni 22nd CPSU Congress (Cmrds. S. Ibragimov, N. Zaydov)	105.3	100.0	102.8	100.0
NGDU Artemneftegaz (Cmrds. B. Khalilov, T. Azizov)	101.6	112.0	100.5	112.5
NGDU imeni Serebrovskiy (Cmrds. F. Musayev, V. Alekperov)	100.0	108.6	97.1	106.0
NGDU imeni N. Narimanov (Cmrds. G. Gumbatov, Z. Mamedov)	100.0	102.2	101.0	102.0
NGDU Bulla-more imeni 50-years of the USSR (Cmrds. B. Mamedov, B. Mirzabekov)	100.0	87.7	94.5	96.2
Altogether for the associations	100.5	100.8	99.6	102.3

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CSO: 1822/108

OIL AND GAS

AZERBAIJAN SSR OIL, GAS PRODUCTION PLAN FULFILLMENT FOR JAN-NOV 84

Baku VYSHKA in Russian 6 Dec 84 p 1

[Monthly listing of production plan fulfillment by the PO [Production Organization] and the NGDU [Oil and Gas Producing Administrations] subordinate to the Ob"yedineniye Azneft [State Association of the Azerbaijan Petroleum Industry] and the VPO Kaspmorneftegazprom [Caspian Sea Petroleum and Gas Industry All-Union Production Association] published under the heading: "Oil and Gas: How production is going"]

[Text] Data from TsSU [Central Statistical Administration] of the Azerbaijan SSR on Oil and Gas Production Plan Fulfillment for January through November

(In percent of plan)

	Nov		Jan-Nov	
	Oil prod.	Gas prod.	Oil prod.	Gas prod.
Azneft Association	94.3	106.8	96.4	103.8
NGDU Leninneft' (chief, Cmrd. R. Vezirov, secrtry. party org., Cmrd E. Makhmudov)	100.0	100.6	98.4	100.6
NGDU imeni 26 Baku Commissars (Cmrds. A. Bagiyev, Ch. Mustafeyev)	100.0	100.8	100.4	102.4
NGDU Ordzhonikidzeneft' (Cmrds. Z. Tagiyev, R. Ragimov)	100.0	111.6	100.2	111.1
NGDU Karadagneft' (Cmrds. K. Kerimov, Z. Abasov)	101.3	105.5	100.6	103.9
NGDU Kirovneft' (Cmrds. T. Mamedov, I. Ibragimov)	100.1	107.9	100.2	105.3
NGDU Azizbekovneft' (Cmrds. T. Gasanov, A. Barbanly)	100.0	182.2	100.2	157.9
NGDU Siazanneft' (Cmrds. M. Musayev, A. Mezhidov)	87.5	101.4	89.5	86.7
NGDU Shirvanneft' (Cmrds. V. Mamedov, Z. Geydarov)	93.5	107.9	98.2	103.7
NGDU Sal'yanyneft' (Cmrds. F. Guseynov, G. Gasanov)	100.0	103.9	101.0	108.2

(In percent of plan)

	Nov		Jan-Nov	
	Oil prod.	Gas prod.	Oil prod.	Gas prod.
Azneft Association (continued)				
NGDU Neftechalaneft' (Cmrds. S. Mamedov, I. Dzhafarov)	100.0	116.3	100.1	110.0
NGDU Muradkhanlyneft' (Cmrds. S. Mudarov, I. Babayev)	37.7	100.0	47.2	74.4
Kaspmorneftegazprom VPO	101.7	100.1	101.1	102.0
PO imeni 22nd CPSU Congress (Cmrds. S. Ibragimov, N. Zaydov)	103.1	100.0	102.8	100.0
NGDU Artemneftegaz (Cmrds. B. Khalilov, T. Azizov)	101.7	111.7	100.6	112.4
NGDU imeni Serebrovskiy (Cmrds. F. Musayev, V. Alekperov)	100.6	106.4	97.4	106.1
NGDU imeni N. Narimanov (Cmrds. G. Gumbatov, Z. Mamedov)	100.0	108.6	100.9	102.6
NGDU Bulla-more imeni 50-years of the USSR (Cmrds. B. Mamedov, B. Mirzabekov)	100.0	86.1	94.9	95.2
Altogether for the associations	99.2	100.4	99.6	102.1

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CSO: 1822/108

OIL AND GAS

AZERBAIJAN SSR OIL, GAS PRODUCTION PLAN FULFILLMENT FOR 1984

Baku VYSHKA in Russian 9 Jan 85 p 1

[Monthly listing of production plan fulfillment by the PO [Production Organization] and the NGDU [Oil and Gas Producing Administrations] subordinate to the Ob"yedineniye Azneft [State Association of the Azerbaijan Petroleum Industry] and the VPO Kaspmorneftegazprom [Caspian Sea Petroleum and Gas Industry All-Union Production Association] published under the heading: "Oil and Gas: How production is going"]

[Text] Data from TsSU [Central Statistical Administration] of the Azerbaijan SSR on Oil and Gas Production Plan Fulfillment for the Year 1984

(In percent of plan)

	Dec		Jan-Dec	
	Oil prod.	Gas prod.	Oil prod.	Gas prod.
Azneft Association	78.9	102.7	94.9	103.8
NGDU Leninneft' (chief, Cmrd. R. Vezirov, secrtry. party org., Cmrd E. Makhmudov)	77.9	100.2	96.6	100.6
NGDU imeni 26 Baku Commissars (Cmrds. A. Bagiyev, Ch. Mustafeyev)	100.0	105.4	100.3	102.6
NGDU Ordzhonikidzeneft' (Cmrds. Z. Tagiyev, R. Ragimov)	80.9	110.3	98.5	111.0
NGDU Karadagneft' (Cmrds. K. Kerimov, Z. Abasov)	100.9	105.5	100.6	104.0
NGDU Kirovneft' (Cmrds. T. Mamedov, I. Ibragimov)	100.1	107.6	100.2	105.5
NGDU Azizbekovneft' (Cmrds. T. Gasanov, A. Barbanly)	86.4	185.1	99.0	160.1
NGDU Siazanneft' (Cmrds. M. Musayev, A. Mezhidov)	78.3	88.3	88.5	86.6
NGDU Shirvanneft' (Cmrds. V. Mamedov, Z. Geydarov)	68.6	100.2	95.7	103.4
NGDU Sal'yanyneft' (Cmrds. F. Guseynov, G. Gasanov)	100.1	100.7	100.9	107.6

(In percent of plan)

	Dec		Jan-Dec	
	Oil prod.	Gas prod.	Oil prod.	Gas prod.
Azneft Association (continued)				
NGDU Neftechalaneft' (Cmrds. S. Mamedov, I. Dzhafarov)	25.7	111.1	93.8	109.8
NGDU Muradkhanlyneft' (Cmrds. S. Mudarov, I. Babayev)	18.3	100.0	44.0	76.5
Kaspmorneftegazprom VPO	100.0	100.4	101.0	101.8
PO imeni 22nd CPSU Congress (Cmrds. S. Ibragimov, N. Zaydov)	102.4	100.0	102.8	100.0
NGDU Artemneftegaz (Cmrds. B. Khalilov, T. Azizov)	104.8	114.0	100.9	112.5
NGDU imeni Serebrovskiy (Cmrds. F. Musayev, V. Alekperov)	103.0	110.6	97.9	106.5
NGDU imeni N. Narimanov (Cmrds. G. Gumbatov, Z. Mamedov)	94.2	105.6	100.4	102.9
NGDU Bulla-more imeni 50-years of the USSR (Cmrds. B. Mamedov, B. Mirzabekov)	94.9	82.9	94.9	94.1
Altogether for the associations	93.0	100.5	99.0	101.9

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AZERBAIJAN SSR OIL DRILLING PLAN FULFILLMENT FOR JAN 84

Baku VYSHKA in Russian 10 Feb 84 p 1

[Monthly listing of the fulfillment of planned drilling penetration (footage) by the UBR [Administrations for Drilling Operations] and URB [Administrations for Exploratory Drilling] subordinate to the Ob"yedineniye Azneft [State Association of the Azerbaijan Petroleum Industry] and by the MUBR [Administrations for Marine Drilling Operations] and MURB [Administrations for Marine Exploratory Drilling] subordinate to the VPO Kaspmorneftegazprom [Caspian Sea Petroleum and Gas Industry All-Union Production Association] published under the heading "Oil and Gas: "How the drilling is going"]

[Text] Data from TsSU [Central Statistical Administration] of the Azerbaijan SSR on the Fulfillment of Planned Drilling Footage for January 1984

(In percent of plan)

	Total ftage	Includng explrtry
Azneft Association	100.9	97.3
Apsheron UBR (Cmrds. A. Khasmamedov, M. Mamedov)	102.8	40.4
Siazan UBR (Cmrds. I. Kagramanov, I. Guvvetov)	40.7	39.5
Ali-Bayramlin UBR (Cmrds. N Alekperov, N. Ismaylov)	101.2	114.6
Neftechalin UBR (Cmrds. D. Akhundov, L. Guseynov)	104.0	73.0
Kyursangin UBR (Cmrds. A. Bakhshiyev, Sh. Abilov)	100.3	100.4
Gobustan URB (Cmrds. A. Abdullayev, V. Mamedov)	100.7	100.7
Dzharlin URB (Cmrds. R. Veliyev, M. Dzhafarov)	107.6	124.7

(In percent of plan)

	Total ftage	Includng explrtry
Kaspmorneftegazprom VPO	108.0	115.5
MUBR Neftyanyye Kamni (Cmrds. O. Abasov, K. Dadashev)	100.3	75.0
MUBR Peschaninsk (Cmrds. Sh. Mekhtiyev, B. Mamedov)	100.4	--
MUBR Sangachal'sk (Cmrds. D. Bayramov, B. Gadzhiyev)	102.7	--
MURB Primorsk (Cmrds. A. Ismaylov, E. Imanov)	111.9	80.5
MURB Bulla (Cmrds. M. Mamedov, A. Ponyayev)	108.6	108.6
MURB Bukhta Il'ich (Cmrds. A. Gasimov, I. Guseynov)	123.9	v 1.9 r*
MURB with STS (Cmrds. A. Musayev, A. Muradverdiyev)	142.4	142.4
Altogether for the associations	104.0	106.8

For the Azneft Association, the Siazan UBR did not cope with the planned footage for January 1984, having underdrilled by 1,600 meters. The Association did not fulfill the plan for exploratory footage (by 200 meters). The Apsheron, Siazan, and Neftechalin drilling administrations underdrilled by 600 m.

For the Kaspmorneftegazprom VPO, the drilling administrations Neftyanyye Kamni and Primorsk did not cope with the plan for exploratory drilling in January, having underdrilled by 400 meters.

*[Translator's note: This seems to be an abbreviation for "v 1.9 raz" or, "by 1.9 times" but its use instead of 190.0 percent as in the other entries is not understood.]

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OIL AND GAS

AZERBAIJAN SSR OIL DRILLING PLAN FULFILLMENT FOR JAN AND FEB 84

Baku VYSHKA in Russian 10 Mar 84 p 1

[Monthly listing of the fulfillment of planned drilling penetration (footage) by the UBR [Administrations for Drilling Operations] and URB [Administrations for Exploratory Drilling] subordinate to the Ob"yedineniye Azneft [State Association of Azerbaijan Petroleum Industry] and by the MUBR [Administrations for Marine Drilling Operations and MURB [Administrations for Marine Exploratory Drilling] subordinate to VPO Kaspmorneftegazprom [Caspian Sea Petroleum and Gas Industry All-Union Production Association] published under the heading "Oil and Gas: How the drilling is going"]

[Text] Data from TsSU [Central Statistical Administration] of the Azerbaijan SSR on the Fulfillment of Planned Drilling Footage for January and February

(In percent of plan)

	February		Jan-Feb	
	Total ftage	Includng Explrtry	Total ftage	Includng Explrtry
Azneft' Association	95.7	71.3	98.3	84.2
Apsheron UBR (Cmrds. A. Khasmamedov M. Mamedov)	102.4	12.3	102.6	23.1
Siazan UBR (Cmrds. I. Kagramanov, I. Guvvetov)	26.3	34.0	33.0	36.6
Ali-Bayramlin UBR (Cmrds. N. Alekperov, N. Ismaylov)	100.7	124.2	101.0	119.4
Neftechalin UBR (Cmrds. D. Akhundov, L. Guseynov)	102.3	26.8	103.1	49.9
Kyursangin UBR (Cmrds. A. Bakhshiyev, Sh. Abilov)	100.3	50.7	100.3	74.4
Gobustan URB (Cmrds. A. Abduliyev, V. Mamedov)	69.6	69.6	85.7	85.7
Dzharlin URB (Cmrds. R. Veliyev M. Dzhafarov)	103.6	109.6	105.6	116.9

(In percent of plan)

	February		Jan-Feb	
	Total ftage	Includng explrtry	Total ftage	Includng explrtry
Kaspmornefetegazprom VPO	100.1	101.7	104.2	108.2
MUBR Neftyanyye Kamni (Cmrds. O. Abasov, K. Dadashev)	100.4	v 2.5 r*	100.4	v 1.6 r*
MUBR Peschaninsk (Cmrds. Sh. Mekhtiyev, B. Mamedov)	100.2	--	100.3	--
MUBR Sangachal'sk (Cmrds. D. Bayramov, B.Gadzhiyev)	105.5	--	103.8	--
MURB Primorsk (Cmrds. A. Ismaylov, E. Imanov)	102.4	92.7	107.2	86.6
MURB Bulla (Cmrds. M. Mamedov, A. Ponyayev)	103.8	103.8	106.1	106.1
MURB Bukhta Il'ich (Cmrds. A. Gasimov, I. Guseynov)	127.0	101.9	125.5	113.7
MURB with STS (Cmrds. A. Musayev, A. Muradverdiyev)	122.0	122.0	132.8	132.8
Altogether for the associations	97.7	87.8	100.9	96.9

According to the results for January and February 1984, the Azneft Association has underdrilled by 1000 meters compared with the planned penetration. The Siazan and Gobustan drilling administrations did not cope with the plan, and have become indebted by 4,700 meters. The association has not fulfilled the plan for exploratory drilling by 2,200 meters. The Apsheron,Siazan, Kyursangin, Gobustan, and Neftechalin drilling administrations have underdrilled by 2,900 meters.

For the Kaspmorneftegazprom VPO, only the Primorsk Administration for Marine Exploratory drilling did not cope with the plan having underdrilled by 500 meters of penetration.

* [Translator's note: These seem to be abbreviations for "v 2.5 raz" and "v 1.6 raz" or, "by 2.5 times" and "by 1.6 times"; but it is not understood why they are not simply 250.0 percent and 160.0 percent as in the other entries.]

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OIL AND GAS

AZERBAIJAN SSR OIL DRILLING PLAN FULFILLMENT FOR 1ST QUARTER OF 1984

Baku VYSHKA in Russian 8 Apr 84 p 1

[Monthly listing of the fulfillment of planned drilling penetration (footage) by the UBR [Administrations for Drilling Operations] and URB [Administrations for Exploratory Drilling] subordinate to the Ob"yedineniye Azneft [State Association of Azerbaijan Petroleum Industry] and by the MUBR [Administrations for Marine Drilling Operations and MURB [Administrations for Marine Exploratory Drilling] subordinate to VPO Kaspmorneftegazprom [Caspian Sea Petroleum and Gas Industry All-Union Production Association] published under the heading "Oil and Gas: How the drilling is going"]

[Text] Data from TsSU [Central Statistical Administration] of the Azerbaijan SSR on the Fulfillment of Planned Drilling Footage for 1st Quarter 1984

(In percent of plan)

	March		1st Qtr	
	Total ftage	Includng Explrtry	Total ftage	Includng Explrtry
Azneft Association	100.1	88.9	99.0	86.0
Apsheron UBR (Cmrds. A. Khasmamedov M. Mamedov)	101.1	74.3	102.1	42.6
Siazan UBR (Cmrds. I. Kagramanov, I. Guvvetov)	71.9	54.0	47.1	43.2
Ali-Bayramlin UBR (Cmrds. N. Alekperov, N. Ismaylov)	102.2	133.2	101.4	124.0
Neftechalin UBR (Cmrds. D. Akhundov, L. Guseynov)	68.5	51.0	88.9	50.3
Kyursangin UBR (Cmrds. A. Bakhshiyev, Sh. Abilov)	102.5	32.7	101.1	56.7
Gobustan URB (Cmrds. A. Abduliyev, V. Mamedov)	106.1	106.1	92.7	92.7
Dzharlin URB (Cmrds. R. Veliyev M. Dzhafarov)	111.2	100.1	107.8	109.7

(In percent of plan)

	March		1st Qtr	
	Total ftage	Includng explrtry	Total ftage	Includng explrtry
Kaspmornefetegazprom VPO	97.1	94.5	101.6	103.1
MUBR Neftyanyye Kamni (Cmrds. O. Abasov, K. Dadashev)	100.1	152.0	100.3	159.8
MUBR Peschaninsk (Cmrds. Sh. Mekhtiyev, B. Mamedov)	100.2	--	100.2	--
MUBR Sangachal'sk (Cmrds. D. Bayramov, B.Gadzhiyev)	100.0	--	102.4	--
MURB Primorsk (Cmrds. A. Ismaylov, E. Imanov)	105.7	104.0	106.7	92.4
MURB Bulla (Cmrds. M. Mamedov, A. Ponyayev)	100.5	100.5	104.0	104.0
MURB Bukhta Il'ich (Cmrds. A. Gasimov, I. Guseynov)	113.7	94.1	120.6	101.6
MURB with STS (Cmrds. A. Musayev, A. Muradverdiyev)	101.9	101.9	123.3	123.3
Altogether for the associations	98.8	91.8	100.1	95.0

According to the results for January through March, the Azneft Association drilled 1,000 meters less than the planned penetration. The drilling administrations of Siazan, Neftechalin and Gobustan have not coped with the plan, being in arrears by 6,300 meters. The Association also did not fulfill the plan for exploratory drilling by 3,100 meters. The Apsheron, Siazan, Kyursangin, Gobustan, and Neftechalin drilling administrations have underdrilled by a total of about 4,000 meters.

For the Kaspmorneftegazprom VPO, only the Primorsk administration for marine exploratory drilling did not cope with the plan for exploratory drilling, being in arrears by 400 meters of penetration.

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OIL AND GAS

AZERBAIJAN SSR OIL DRILLING PLAN FULFILLMENT FOR JAN-APR 84

Baku VYSHKA in Russian 11 May 84 p 2

[Monthly listing of the fulfillment of planned drilling penetration (footage) by the UBR [Administrations for Drilling Operations] and URB [Administrations for Exploratory Drilling] subordinate to the Ob"yedineniye Azneft [State Association of Azerbaijan Petroleum Industry] and by the MUBR [Administrations for Marine Drilling Operations and MURB [Administrations for Marine Exploratory Drilling] subordinate to VPO Kaspmorneftegazprom [Caspian Sea Petroleum and Gas Industry All-Union Production Association] published under the heading "Oil and Gas: How the drilling is going"]

[Text] Data from TsSU [Central Statistical Administration] of the Azerbaijan SSR on the Fulfillment of Planned Drilling Footage for January through April

(In percent of plan)

	April		Jan-Apr	
	Total ftage	Includng Explrtry	Total ftage	Includng Explrtry
Azneft Association	88.4	79.9	96.0	84.1
Apsheron UBR (Cmrds. A. Khasmamedov M. Mamedov)	63.5	2.9	91.9	27.4
Siazan UBR (Cmrds. I. Kagramanov, I. Guvvetov)	51.0	25.3	48.2	37.6
Ali-Bayramlin UBR (Cmrds. N. Alekperov, N. Ismaylov)	100.3	124.6	101.1	124.2
Neftechalin UBR (Cmrds. D. Akhundov, L. Guseynov)	112.7	111.5	95.2	71.6
Kyursangin UBR (Cmrds. A. Bakhshiyev, Sh. Abilov)	100.2	100.9	100.8	69.0
Gobustan URB (Cmrds. A. Abduliyev, V. Mamedov)	69.1	69.1	85.8	85.8
Dzharlin URB (Cmrds. R. Veliyev M. Dzhafarov)	101.4	106.6	105.9	108.7

(In percent of plan)

	April		Jan-Apr	
	Total ftage	Includng explrtry	Total ftage	Includng explrtry
Kaspmornefetegazprom VPO	90.7	100.0	98.8	102.3
MUBR Neftyanyye Kamni (Cmrds. O. Abasov, K. Dadashev)	100.1	63.2	100.2	131.4
MUBR Peschaninsk (Cmrds. Sh. Mekhtiyev, B. Mamedov)	100.1	--	100.2	--
MUBR Sangachal'sk (Cmrds. D. Bayramov, B.Gadzhiyev)	54.2	--	89.6	--
MURB Primorsk (Cmrds. A. Ismaylov, E. Imanov)	108.4	123.5	107.1	100.2
MURB Bulla (Cmrds. M. Mamedov, A. Ponyayev)	100.7	100.7	103.2	103.2
MURB Bukhta Il'ich (Cmrds. A. Gasimov, I. Guseynov)	139.5	35.2	125.4	80.0
MURB with STS (Cmrds. A. Musayev, A. Muradverdiyev)	116.6	116.6	121.6	121.6
Altogether for the associations	89.4	89.5	97.2	93.3

According to the results for January through April 1984, the Azneft Association, compared with the plan, underdrilled by 5,500 meters of penetration. The drilling administrations of Siazan, Neftechalin, Gobustan, and Apsheron did not cope with the plan, being in arrears by 10,300 meters. The association also did not fulfill the plan for exploratory drilling by 5,100 meters. The Gobustan and Neftechalin drilling administrations have underdrilled by a total of 6,300 meters of penetration.

The Kaspmorneftegazprom VPO, since the beginning of the year, has underdrilled compared to the plan by 1,200 meters. The Sangachal'sk administration for marine drilling operations is in arrears to the plan by 2,900 meters. Only the Bukhta Il'ich administration for marine exploratory drilling has not coped with the plan for exploratory drilling, having underdrilled by 900 meters of penetration.

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OIL AND GAS

AZERBAIJAN SSR OIL DRILLING PLAN FULFILLMENT FOR JAN-MAY 84

Baku VYSHKA in Russian 8 Jun 84 p 1

[Monthly listing of the fulfillment of planned drilling penetration (footage) by the UBR [Administrations for Drilling Operations] and URB [Administrations for Exploratory Drilling] subordinate to the Ob"yedineniye Azneft [State Association of Azerbaijan Petroleum Industry] and by the MUBR [Administrations for Marine Drilling Operations and MURB [Administrations for Marine Exploratory Drilling] subordinate to VPO Kaspmorneftegazprom [Caspian Sea Petroleum and Gas Industry All-Union Production Association] published under the heading "Oil and Gas: How the drilling is going"]

[Text] Data from TsSU [Central Statistical Administration] of the Azerbaijan SSR on the Fulfillment of Planned Drilling Footage for January through May

(In percent of plan)

	May		Jan-May	
	Total ftage	Includng Explrtry	Total ftage	Includng Explrtry
Azneft Association	100.0	86.0	96.9	84.1
Apsheron UBR (Cmrds. A. Khasmamedov M. Mamedov)	102.2	35.2	94.0	29.6
Siazan UBR (Cmrds. I. Kagramanov, I. Guvvetov)	85.6	--	56.5	28.7
Ali-Bayramlin UBR (Cmrds. N. Alekperov, N. Ismaylov)	101.6	100.1	101.2	118.3
Neftechalin UBR (Cmrds. D. Akhundov, L. Guseynov)	102.1	113.6	96.8	84.3
Kyursangin UBR (Cmrds. A. Bakhshiyev, Sh. Abilov)	101.6	146.7	101.0	87.2
Gobustan URB (Cmrds. A. Abduliyev, V. Mamedov)	75.1	75.1	83.3	83.3
Dzharlin URB (Cmrds. R. Veliyev M. Dzhafarov)	101.9	107.7	104.9	108.4

(In percent of plan)

	May		Jan-May	
	Total ftage	Includng explrtry	Total ftage	Includng explrtry
Kaspmornefetegazprom VPO	101.0	93.6	99.3	100.4
MUBR Neftyanyye Kamni (Cmrds. O. Abasov, K. Dadashev)	100.7	103.0	100.3	126.0
MUBR Peschaninsk (Cmrds. Sh. Mekhtiyev, B. Mamedov)	104.6	--	101.1	--
MUBR Sangachal'sk (Cmrds. D. Bayramov, B.Gadzhiyev)	109.1	--	93.4	--
MURB Primorsk (Cmrds. A. Ismaylov, E. Imanov)	100.3	131.1	105.7	106.4
MURB Bulla (Cmrds. M. Mamedov, A. Ponyayev)	100.4	100.4	102.6	102.6
MURB Bukhta Il'ich (Cmrds. A. Gasimov, I. Guseynov)	130.8	45.9	126.4	71.6
MURB with STS (Cmrds. A. Musayev, A. Muradverdiyev)	102.3	102.3	117.6	117.6
Altogether for the associations	100.4	89.5	97.9	92.5

According to the results for January through May 1984, the Azneft Association, compared to the plan, underdrilled by 5,400 meters of penetration. The Siazan, Neftechalin, and Apsheron drilling administrations have not coped with the plan, having become indebted by 12,000 meters. The association also has not fulfilled the plan for exploratory drilling by 6,500 meters. The Apsheron, Siazan, Kyursangin, Gobustan, and Neftechalin drilling administrations have underdrilled by a total of 7,900 meters.

The Kaspmorneftegazprom VPO,since the beginning of the year, has underdrilled by 1,000 meters of penetration. The Sangachal'sk administration for marine drilling operations has become indebted to the plan by 2,300 meters. Compared to the plan for exploratory drilling, only the Bukhta Il'ich administration for marine exploratory drilling has not coped, having underdrilled by 1,700 meters.

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OIL AND GAS

AZERBAIJAN SSR OIL DRILLING PLAN FULFILLMENT FOR 1ST QUARTER OF 1984

Baku VYSHKA in Russian 8 Jul 84 p 1

[Monthly listing of the fulfillment of planned drilling penetration (footage) by the UBR [Administrations for Drilling Operations] and URB [Administrations for Exploratory Drilling] subordinate to the Ob"yedineniye Azneft [State Association of Azerbaijan Petroleum Industry] and by the MUBR [Administrations for Marine Drilling Operations and MURB [Administrations for Marine Exploratory Drilling] subordinate to VPO Kaspmorneftegazprom [Caspian Sea Petroleum and Gas Industry All-Union Production Association] published under the heading "Oil and Gas: How the drilling is going"]

[Text] Data from TsSU [Central Statistical Administration] of the Azerbaijan SSR on the Fulfillment of Planned Drilling Footage for the 1st Half of 1984

(In percent of plan)

	June		1st Half of 1984	
	Total ftage	Includng Explrtry	Total ftage	Includng Explrtry
Azneft Association	94.3	77.6	96.4	83.2
Apsheron UBR (Cmrds. A. Khasmamedov M. Mamedov)	100.6	31.1	95.1	29.9
Siazan UBR (Cmrds. I. Kagramanov, I. Guvvetov)	66.4	1.6	58.3	23.5
Ali-Bayramlin UBR (Cmrds. N. Alekperov, N. Ismaylov)	96.7	--	100.4	96.3
Neftechalin UBR (Cmrds. D. Akhundov, L. Guseynov)	58.1	39.0	89.5	73.8
Kyurszngin UBR (Cmrds. A. Bakhshiyev, Sh. Abilov)	100.1	104.0	100.8	90.8
Gobustan URB (Cmrds. A. Abduliyev, V. Mamedov)	105.6	105.6	87.5	87.5
Dzharlin URB (Cmrds. R. Veliyev M. Dzhafarov)	102.8	100.1	104.5	106.7

	(In percent of plan)			
	June		1st Half of 1984	
	Total ftage	Includng explrtry	Total ftage	Includng explrtry
Kaspmornefetegazprom VPO	100.2	100.7	99.4	100.5
MUBR Neftyanyye Kamni (Cmrds. O. Abasov, K. Dadashev)	102.4	144.5	100.7	129.0
MUBR Peschaninsk (Cmrds. Sh. Mekhtiyev, B. Mamedov)	112.5	--	103.0	--
MUBR Sangachal'sk (Cmrds. D. Bayramov, B.Gadzhiyev)	93.1	--	93.3	--
MURB Primorsk (Cmrds. A. Ismaylov, E. Imanov)	100.7	100.0	104.9	105.3
MURB Bulla (Cmrds. M. Mamedov, A. Ponyayev)	103.8	103.8	102.8	102.8
MURB Bukhta Il'ich (Cmrds. A. Gasimov, I. Guseynov)	115.4	47.5	124.6	67.4
MURB with STS (Cmrds. A. Musayev, A. Muradverdiyev)	105.6	105.6	115.6	115.6
Altogether for the associations	96.8	88.3	97.7	91.8

According to the results for the 1st half of 1984, the Azneft Association has underdrilled compared to the plan by 7,600 meters of penetration. The Siazan, Neftechalin, Gobustan, and Apsheron drilling administrations have not coped with the plan, being in arrears by 14,100 meters. The association also has not fulfilled the plan for exploratory drilling by 8,900 meters. The Apsheron,Siazan, Kyursangin, Gobustan and Heftechalin drilling administrations have underdrilled by a total of 9,900 meters of penetration.

Since the beginning of the year, the Kaspmorneftegazprom VPO, compared with the plan for penetration, has underdrilled by 900 meters. The Sangachal'sk administration for marine drilling operations has become indebted to the plan by 2,800 meters. Only the Bukhta Il'ich administration for marine exploratory drilling has not coped with the plan for exploratory drilling, having underdrilled by 2,300 meters.

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AZERBAIJAN SSR OIL DRILLING PLAN FULFILLMENT FOR JAN-JUL 84

Baku VYSHKA in Russian 11 Aug 84 p 1

[Monthly listing of the fulfillment of planned drilling penetration (footage) by the UBR [Administrations for Drilling Operations] and URB [Administrations for Exploratory Drilling] subordinate to the Ob"yedineniye Azneft [State Association of Azerbaijan Petroleum Industry] and by the MUBR [Administrations for Marine Drilling Operations and MURB [Administrations for Marine Exploratory Drilling] subordinate to VPO Kaspmorneftegazprom [Caspian Sea Petroleum and Gas Industry All-Union Production Association] published under the heading "Oil and Gas: How the drilling is going"]

[Text] Data from TsSU [Central Statistical Administration] of the Azerbaijan SSR on the Fulfillment of Planned Drilling Footage for January through July

(In percent of plan)

	July		Jan-July	
	Total ftage	Incl udng Explrtry	Total ftage	Incl udng Explrtry
Azneft Association	71.1	44.1	92.6	76.3
Apsheron UBR (Cmrds. A. Khasmamedov M. Mamedov)	106.2	--	96.6	24.9
Siazan UBR (Cmrds. I. Kagramanov, I. Guvvetov)	100.1	5.8	63.4	20.7
Ali-Bayramlin UBR (Cmrds. N. Alekperov, N. Ismaylov)	30.6	12.3	89.1	76.2
Neftechalin UBR (Cmrds. D. Akhundov, I. Guseynov)	100.3	75.2	91.1	74.1
Kyursangin UBR (Cmrds. A. Bakhshiyev, Sh. Abilov)	71.8	34.7	96.6	77.0
Gobustan URB (Cmrds. A. Abduliyev, V. Mamedov)	48.0	48.0	81.3	81.3
Dzharlin URB (Cmrds. R. Veliyev M. Dzhafarov)	72.5	69.6	100.1	101.1

(In percent of plan)

	July		Jan-July	
	Total ftage	Includng explrtry	Total ftage	Includng explrtry
Kaspmornefetegazprom VPO	79.4	86.0	96.2	98.1
MUBR Neftyanyye Kamni (Cmrds. O. Abasov, K. Dadashev)	100.4	14.7	100.7	116.7
MUBR Peschaninsk (Cmrds. Sh. Mekhtiyev, B. Mamedov)	100.3	--	102.6	--
MUBR Sangachal'sk (Cmrds. D. Bayramov, B.Gadzhiyev)	41.6	--	83.7	--
MURB Primorsk (Cmrds. A. Ismaylov, E. Imanov)	75.9	72.8	100.2	100.0
MURB Bulla (Cmrds. M. Mamedov, A. Ponyayev)	101.0	101.0	102.5	102.5
MURB Bukhta Il'ich (Cmrds. A. Gasimov, I. Guseynov)	100.4	32.7	121.1	63.1
MURB with STS (Cmrds. A. Musayev, A. Muradverdiyev)	103.0	103.0	113.6	113.6
Altogether for the associations	74.8	63.8	94.1	87.0

According to the results for January through July, the Azneft Association, compared to the plan, has underdrilled by 18,600 meters of penetration. With the exception of the Dzharlin URB, all the remaining administrations for drilling operations have not coped with the plan, being in arrears by 22,500 meters. The association also has not fulfilled the plan for exploratory drilling by 15,200 meters.

Since the beginning of the year the Kaspmorneftegazprom VPO, compared with the plan has underdrilled by 7,100 meters of penetration. The Sangachal'sk administration for marine drilling operations has become indebted to the plan by 8,500 meters. The association also has not fulfilled the plan for exploratory drilling by 1,200 meters. Only the Bukhta Il'ich administration for marine exploratory drilling has not coped with the plan having underdrilled by more than 3,000 meters.

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OIL AND GAS

AZERBAIJAN SSR OIL DRILLING PLAN FULFILLMENT FOR JAN-AUG 84

Baku VYSHKA in Russian 11 Sep 84 p 1

[Monthly listing of the fulfillment of planned drilling penetration (footage) by the UBR [Administrations for Drilling Operations] and URB [Administrations for Exploratory Drilling] subordinate to the Ob"yedineniye Azneft [State Association of Azerbaijan Petroleum Industry] and by the MUBR [Administrations for Marine Drilling Operations and MURB [Administrations for Marine Exploratory Drilling] subordinate to VPO Kaspmorneftegazprom [Caspian Sea Petroleum and Gas Industry All-Union Production Association] published under the heading "Oil and Gas: How the drilling is going"]

[Text] Data from TsSU [Central Statistical Administration] of the Azerbaijan SSR on the Fulfillment of Planned Drilling Footage for January through August

(In percent of plan)

	August		Jan-Aug	
	Total ftage	Includng Explrtry	Total ftage	Includng Explrtry
Azneft Association	68.5	64.2	89.3	74.4
Apsheron UBR (Cmrds. A. Khasmamedov M. Mamedov)	39.2	--	89.9	22.1
Siazan UBR (Cmrds. I. Kagramanov, I. Guvvetov)	52.3	4.3	70.7	18.4
Ali-Bayramlin UBR (Cmrds. N. Alekperov, N. Ismaylov)	52.3	58.5	83.9	72.3
Neftechalin UBR (Cmrds. D. Akhundov, L. Guseynov)	81.4	36.5	89.9	69.0
Kyursangin UBR (Cmrds. A. Bakhshiyev, Sh. Abilov)	100.4	34.1	97.1	67.9
Gobustan URB (Cmrds. A. Abduliyev, V. Mamedov)	76.8	76.8	80.6	80.6
Dzharlin URB (Cmrds. R. Veliyev M. Dzhafarov)	100.5	104.4	100.1	101.6

(In percent of plan)

	August		Jan-Aug	
	Total ftage	Includng explrtry	Total ftage	Includng explrtry
Kaspmornefetegazprom VPO	73.3	46.1	93.2	90.9
MUBR Neftyanyye Kamni (Cmrds. O. Abasov, K. Dadashev)	100.5	--	100.6	105.4
MUBR Peschanlnsk (Cmrds. Sh. Mekhtiyev, B. Mamedov)	100.6	--	102.4	--
MUBR Sangachal'sk (Cmrds. D. Bayramov, B.Gadzhiyev)	85.2	--	83.9	--
MURB Primorsk (Cmrds. A. Ismaylov, E. Imanov)	58.5	62.7	94.5	94.9
MURB Bulla (Cmrds. M. Mamedov, A. Ponyayev)	36.7	36.7	93.4	93.4
MURB Bukhta Il'ich (Cmrds. A. Gasimov, I. Guseynov)	53.6	40.0	112.3	60.6
MURB with STS (Cmrds. A. Musayev, A. Muradverdiyev)	61.2	61.2	106.3	106.3
Altogether for the associations	70.6	56.0	91.0	82.4

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AZERBAIJAN SSR OIL DRILLING PLAN FULFILLMENT FOR JAN-SEP 84

Baku VYSHKA in Russian 9 Oct 84 p 2

[Monthly listing of the fulfillment of planned drilling penetration (footage) by the UBR [Administrations for Drilling Operations] and URB [Administrations for Exploratory Drilling] subordinate to the Ob"yedineniye Azneft [State Association of Azerbaijan Petroleum Industry] and by the MUBR [Administrations for Marine Drilling Operations and MURB [Administrations for Marine Exploratory Drilling] subordinate to VPO Kaspmorneftegazprom [Caspian Sea Petroleum and Gas Industry All-Union Production Association] published under the heading "Oil and Gas: How the drilling is going"]

[Text] Data from TsSU [Central Statistical Administration] of the Azerbaijan SSR on the Fulfillment of Planned Drilling Footage for January through September

(In percent of plan)

	September		Jan-Sep	
	Total ftage	Includng Explrtry	Total ftage	Includng Explrtry
Azneft Association	62.2	44.5	86.1	70.1
Apsheron UBR (Cmrds. A. Khasmamedov M. Mamedov)	44.6	--	85.4	21.1
Siazan UBR (Cmrds. I. Kagramanov, I. Guvvetov)	71.4	--	63.1	16.0
Ali-Bayramlin UBR (Cmrds. N. Alekperov, N. Ismaylov)	67.2	47.6	81.9	67.6
Neftechalin UBR (Cmrds. D. Akhundov, L. Guseynov)	66.1	7.0	86.9	58.8
Kyursangin UBR (Cmrds. A. Bakhshiyev, Sh. Abilov)	39.8	4.1	90.5	54.8
Gobustan URB (Cmrds. A. Abduliyev, V. Mamedov)	52.3	52.3	77.2	77.2
Dzharlin URB (Cmrds. R. Veliyev M. Dzhafarov)	100.3	94.4	100.2	100.7

(In percent of plan)

	September		Jan-Sep	
	Total ftage	Includng explrtry	Total ftage	Includng explrtry
Kaspmornefteg azprom VPO	88.2	62.7	92.6	87.4
MUBR Neftyanyye Kamni (Cmrds. G. Abasov, K. Dadashev)	100.2	--	100.6	99.1
MUBR Peschaninsk (Cmrds. Sh. Nakhtiyev, B. Mamedov)	100.3	--	102.1	--
MUBR Sangachal'sk (Cmrds. M. Bayramov, B.Gadzhiyev)	100.1	--	85.6	--
MURB Primorsk (Cmrds. A. Ismayilov, E. Imanov)	103.4	75.4	95.6	91.1
MURB Bulla (Cmrds. N. Nemedov, A. Ponyayev)	49.1	49.1	87.8	87.8
MURB Bukhta Il'icha (Cmrds. A. Kasimov, I. Guseynov)	167.0	31.1	117.8	97.7
MURB with STS (Cmrds. A. Musayev, A. Muradverdiyev)	102.0	102.8	105.9	105.9
Altogether for the associations	73.5	52.6	88.9	78.4

For the nine months of the current year both associations have not fulfilled the plan for drilling. Compared to the corresponding period last year, the amount of drilling operations is lower by 10.8 percent.

The Azneft Association has permitted a large lag where, compared with the plan, it has underdrilled by 46,000 meters including 26,000 meters of exploratory drilling. Here, of seven drilling administrations, only one has coped with the plan. The drilling operations at the new prospective deposit of Tarsdallyar are being conducted unsatisfactorily.

For the Kaspomornefteg azprom VPO, the Sangachal'sk, Primorsk, and Bulla drilling administrations have not coped with the plan for drilling penetration. For the association as a whole since the beginning of the year, compared with the plan, 15,000 meters have not been drilled including 10,000 meters of exploratory penetration.

Such a situation in many respects is explained by serious errors in the organization and conduct of drilling operations and a low level of labor and production discipline.

The managers of the associations, the drilling administrations and their party organizations should take measures to accelerate and improve the situation in drilling. Should provide for the efficient use of resources, and should increase the responsibility of personnel charged with the matter. It is necessary to secure a sharp increase in the productivity of drilling tise, in the speed of penetration, and uninterrupted supplying of wells being drilled with equipment, tools, and materials.

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AZERBAIJAN SSR OIL DRILLING PLAN FULFILLMENT FOR JAN-OCT 84

Baku VYSHKA in Russian 11 Nov 84 p 1

[Monthly listing of the fulfillment of planned drilling penetration (footage) by the UBR [Administrations for Drilling Operations] and URB [Administrations for Exploratory Drilling] subordinate to the Ob"yedineniye Azneft [State Association of Azerbaijan Petroleum Industry] and by the MUBR [Administrations for Marine Drilling Operations and MURB [Administrations for Marine Exploratory Drilling] subordinate to VPO Kaspmorneftegazprom [Caspian Sea Petroleum and Gas Industry All-Union Production Association] published under the heading "Oil and Gas: How the drilling is going"]

[Text] Data from TsSU [Central Statistical Administration] of the Azerbaijan SSR on the Fulfillment of Planned Drilling Footage for January through October

(In percent of plan)

	October		Jan-Oct	
	Total ftage	Includng Explrtry	Total ftage	Includng Explrtry
Azneft Association	75.2	50.2	85.0	68.3
Apsheron UBR (Cmrds. A. Khasmamedov M. Mamedov)	108.5	--	87.0	20.8
Siazan UBR (Cmrds. I. Kagramanov, I. Guvvetov)	59.5	--	62.8	14.4
Ali-Bayramlin UBR (Cmrds. N. Alekperov, N. Ismaylov)	101.0	28.8	83.9	62.9
Neftechalin UBR (Cmrds. D. Akhundov, L. Guseynov)	100.3	16.2	88.2	55.5
Kyursangin UBR (Cmrds. A. Bakhshiyev, Sh. Abilov)	39.5	16.3	84.9	50.6
Gobustan URB (Cmrds. A. Abduliyev, V. Mamedov)	60.6	60.6	75.5	75.5
Dzharlin URB (Cmrds. R. Veliyev M. Dzhafarov)	103.5	101.7	100.4	100.7

(In percent of plan)

	October		Jan-Oct	
	Total ftage	Includng explrtry	Total ftage	Includng explrtry
Kaspmornefetegazprom VPO	80.0	76.0	91.4	86.2
MUBR Neftyanyye Kamni (Cmrds. O. Abasov, K. Dadashev)	100.3	--	100.6	99.0
MUBR Peschaninsk (Cmrds. Sh. Mekhtiyev, B. Mamedov)	81.6	--	100.2	--
MUBR Sangachal'sk (Cmrds. D. Bayramov, B.Gadzhiyev)	56.3	--	82.6	--
MURB Primorsk (Cmrds. A. Ismaylov, £. Imanov)	100.1	67.8	96.0	90.0
MURB Bulla (Cmrds. M. Mamedov, A. Ponyayev)	101.1	101.1	89.2	89.2
MURB Bukhta Il'ich (Cmrds. A. Gasimov, I. Guseynov)	134.7	142.9	119.3	62.6
MURB with STS (Cmrds. A. Musayev, A. Muradverdiyev)	62.2	62.2	101.1	101.1
Altogether for the associations	77.2	63.4	87.7	77.0

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OIL AND GAS

AZERBAIJAN SSR OIL DRILLING PLAN FULFILLMENT FOR JAN-NOV 84

Baku VYSHKA in Russian 8 Dec 84 p 1

[Monthly listing of the fulfillment of planned drilling penetration (footage) by the UBR [Administrations for Drilling Operations] and URB [Administrations for Exploratory Drilling] subordinate to the Ob"yedineniye Azneft [State Association of Azerbaijan Petroleum Industry] and by the MUBR [Administrations for Marine Drilling Operations and MURB [Administrations for Marine Exploratory Drilling] subordinate to VPO Kaspmorneftegazprom [Caspian Sea Petroleum and Gas Industry All-Union Production Association] published under the heading "Oil and Gas: How the drilling is going"]

[Text] Data from TsSU [Central Statistical Administration] of the Azerbaijan SSR on the Fulfillment of Planned Drilling Footage for January through November (in percent of plan)

	November		Jan-Nov	
	Total ftage	Includng Explrtry	Total ftage	Includng Explrtry
Azneft Association	94.9	43.6	84.5	66.0
Apsheron UBR (Cmrds. A. Khasmamedov M. Mamedov)	109.3	--	88.6	20.6
Siazan UBR (Cmrds. I. Kagramanov, I. Guvvetov)	100.6	27.0	65.6	15.5
Ali-Bayramlin UBR (Cmrds. N. Alekperov, N. Ismaylov)	100.9	41.9	85.5	60.3
Neftechalin UBR (Cmrds. D. Akhundov, L. Guseynov)	93.1	1.9	80.6	47.2
Kyursangin UBR (Cmrds. A. Bakhshiyev, Sh. Abilov)	88.1	39.6	83.3	49.6
Gobustan URB (Cmrds. A. Abduliyev, V. Mamedov)	91.6	91.6	71.7	71.7
Dzharlin UPB (Cmrds. R. Veliyev M. Dzhafarov)	102.7	102.7	100.6	100.9

(In percent of plan)

	November		Jan-Nov	
	Total ftage	Includng explrtry	Total ftage	Includng explrtry
Kaspmornefetegazprom VPO	70.0	67.6	89.5	84.6
MUBR Neftyanyye Kamni (Cmrds. O. Abasov, K. Dadashev)	31.5	--	94.7	99.0
MUBR Peschaninsk (Cmrds. Sh. Mekhtiyev, B. Mamedov)	88.6	--	99.1	--
M'BR Sangachal'sk (Cmrds. D. Bayramov, B.Gadzhiyev)	73.1	--	81.8	--
MURB Primorsk (Cmrds. A. Ismaylov, E. Imanov)	53.0	55.5	92.0	87.0
MURB Bulla (Cmrds. M. Mamedov, A. Ponyayev)	101.1	101.1	90.3	90.3
MURB Bukhta Il'ich (Cmrds. A. Gasimov, I. Guseynov)	75.2	70.7	115.8	63.1
MURB with STS (Cmrds. A. Musayev, A. Muradverdiyev)	67.8	67.8	98.2	98.2
Altogether for the associations	75.2	55.1	86.6	75.0

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OIL AND GAS

AZERBAIJAN SSR OIL DRILLING PLAN FULFILLMENT FOR 1984

Baku VYSHKA in Russian 10 Jan 85 p 1

[Monthly listing of the fulfillment of planned drilling penetration (footage) by the UBR [Administrations for Drilling Operations] and URB [Administrations for Exploratory Drilling] subordinate to the Ob"yedineniye Azneft [State Association of Azerbaijan Petroleum Industry] and by the MUBR [Administrations for Marine Drilling Operations and MURB [Administrations for Marine Exploratory Drilling] subordinate to VPO Kaspmorneftegazprom [Caspian Sea Petroleum and Gas Industry All-Union Production Association] published under the heading "Oil and Gas: How the drilling is going"]

[Text] Data from TsSU [Central Statistical Administration] of the Azerbaijan SSR on the Fulfillment of Planned Drilling Footage for the year 1984

(In percent of plan)

	December		Jan-Dec	
	Total ftage	Includng Explrtry	Total ftage	Includng Explrtry
Azneft Association	67.3	38.0	82.9	63.1
Apsheron UBR (Cmrds. A. Khasmamedov M. Mamedov)	52.9	--	85.0	13.8
Siazan UBR (Cmrds. I. Kagramanov, I. Guvvetov)	101.3	4.8	67.9	14.6
Ali-Bayramlin UBR (Cmrds. N. Alekperov, N. Ismaylov)	69.0	22.2	84.1	55.4
Neftechalin UBR (Cmrds. D. Akhundov, L. Guseynov)	55.1	--	78.1	41.9
Kyursangin UBR (Cmrds. A. Bakhshiyev, Sh. Abilov)	69.9	27.6	82.1	48.2
Gobustan URB (Cmrds. A. Abduliyev, V. Mamedov)	39.1	39.1	69.0	69.0
Dzharlin URB (Cmrds. R. Veliyev M. Dzhafarov)	103.6	103.6	100.9	101.2

(In percent of plan)

	December		Jan-Dec	
	Total ftage	Includng explrtry	Total f'age	Includng explrtry
Kaspmornefetegazprom VPO	71.6	68.6	87.8	83.2
MUBR Neftyanyye Kamni (Cmrds. O. Abasov, K. Dadashev)	155.2	300.3	100.1	134.3
MUBR Peschaninsk (Cmrds. Sh. Mekhtiyev, B. Mamedov)	110.5	--	100.0	--
MUBR Sangachal'sk (Cmrds. D. Bayramov, B.Gadzhiyev)	48.8	--	78.8	--
MURB Pr morsk (Cmrds. A. Ismaylov, E. Imanov)	59.6	52.4	89.2	84.2
MURB Bulla (Cmrds. M. Mamedov, A. Ponyayev)	65.3	65.3	88.2	88.2
MURB Bukhta Il'ich (Cmrds. A. Gasimov, I. Guseynov)	68.0	68.0	110.5	63.7
MURB with STS (Cmrds. A. Musayev, A. Muradverdiyev)	77.0	77.0	96.3	96.3
Altogether for the associations	69.2	51.4	85.0	72.7

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OIL AND GAS

BRIEFS

KAZAKHSTAN OIL FIELD CONSTRUCTION--The first phase of the construction for the Zhanazhol'sk oil and gas bearing deposit in west Kazakhstan has been completed. An installation for obtaining sulfur from gas has been made ready for loading. [Text] [Moscow EKONOMICHESKAYA GAZETA in Russian No 48, Nov 84 p 2] 9136

CASPIAN REGION OIL--The search is progressing and the production of "black gold" is growing in west Kazakhstan - a prospective oil and gas bearing region of the country which is being developed. At the Tengiz deposit in the Caspian region, geophysicists have proposed a new method of exploring wells by means of the rare element radon. Essentially , radon gas is mixed with water in a special container. Then the indicator liquid is injected into the well with the drilling mud. It quickly penetrates into the pores and cracks of the formation forming so-called gamma zones which are easily monitored with instruments. The degree of penetration of the reserves precisely confirms the presence of oil. The new method is especially effective for deposits with an elevated aggressive environment which complicates the use of traditional instruments. With the same method, the condition of wells and the quality of their cementation can be monitored very well. The oil producers are conducting a search for more economic methods of recovering liquid fuel. [By F. Matskevich, special correspondent of IZVESTIYA] [Text] [Moscow IZVESTIYA in Russian 18 Jul 84 p 1] 9136

NEW BALTIC DRILLING RIG--Near Klaipeda on the Baltic tests are being completed on a new drilling rig produced at the Uralmash plant. "These rigs of the semisubmersible type are intended for exploiting the riches of the continental shelf" says the chief of the department of seagoing drilling rigs of Uralmash production association, Laureate of the USSR State Prize B.V. Shakhotkin. The new equipment provides for drilling exploratory or production wells to 6,500 meters in a water depth of 200 meters. [Text] [Moscow SOVETSKAYA ROSSIYA in Russian 23 Dec 84 p 6] 9136

KOMI OIL PRODUCTION--Komi ASSR--The oil field developed by oilmen of the Komineft association in the thick forest kray at the North Savinoborsk deposit has come out at the planned level of productivity. Over the last year the production of the liquid fuel here has been increased by a factor of more than 1.5. The Komsomol youth collective led by communist V. Neredov every day is taking from the underground storeroom scores of tons more oil than specified by the plan. The ahead-of-plan output of the oil field is the

result of accelerated construction at the deposit and efficient operation of the modern oil field equipment. [By V. Il'ich] [Text] [Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 20 Nov 84 p 1] 9136.

NEW OIL WELL--Sal'yany (Azerinform)--At the beginning of the year the oil field men of Karabaglov set about the exploitation of the well successfully drilled by the brigade of the experienced foreman Armamed Maksudov from the Kyursangin UBR [Administration of Drilling Operations]. According to preliminary estimates, from a depth of 3,400 meters it yields up to 25 tons of pure oil daily. The work at this site is being carried out by one of the best brigades of the oil field led by Rakhman Aliyev. "The new well site has confirmed the promise of the fifth stratum of the productive sediments of the Karabaglinsk deposit" Murshud Gasanov, chief geologist of the Sal'yanyneft NGDU [Oil and Gas Producing Administration], told the Azerinform correspondent. Annually the probers of the depths give the oilmen of the NGDU up to twenty wells which contributes not only to stabilizing, but to increasing the production of the liquid fuel at this promising Shirvan deposit. [Text] [Baku VYSHKA in Russian 8 Jan 85 p 1] 9136

OIL FIELD CONSTRUCTION CENTRALIZED--Aktyubinsk--A new subdivision, Glavkazneftegazstroy, has been created by a decision of the USSR Ministry of Construction of Petroleum and Gas Industry Enterprises for the timely exploitation of the large regional deposits of West Kazakhstan. "The tasks before us are complex" says the chief of Glavkazneftegazstroy, Marat Ospanovich Tulepov. "The comprehensive development of the region requires the assimilation of a huge volume of construction work. The first activity for it has begun, a construction and production base has been created. For its production alone, more than 200 million rubles will have been allocated in the 12th Five-Year Plan. It is assured that we must shoulder this amount of work. Right now, the main problem for the board is the formation of a stable collective and the organization of its productive units." In the next years it has been planned to equip the oil deposits of the Kul'sar, Tengiz, and Gur'yev oblasts. The oil developments of the Mangyshlak deposits will receive further development. The board is taking a very active part in continuing and placing in service the second phase of the Zhanazholsk complex and also in creating the necessary conditions for the oilmen of Kenkiyak. The oil and gas construction people intend to produce annually 150,000 square meters of dwelling space. [By special correspondent Yu. Pautov] [Text] [KAZAKHSTANSKAYA PRAVDA in Russian 23 Dec 84 p 1] 9136

WELL REPAIRS--Sal'yany (AzerINFORM)--On the eve of the 67th anniversary of the Great October Revolution, the brigade for underground well repair of Mirkasum Miralekperov from the Sal'yanyneft' NGDU [Oil and Gas Production Administration] reexamined its socialist obligations. It was decided to repair, supplementarily, three more wells before the end of the year. The Sal'yaneft' workers will meet the October holiday with good results in the work. The collective of the shop for underground and capital repair of wells is bringing in a large contribution to the overall success. Since the beginning of the year, its workers restored about 300 wells which resulted in obtaining more than 100 tons of valuable raw material. The main thing that distinguishes this advanced collective is the excellent proprietorship of the equipment and high craftsmanship. Thanks to the diligence of the administrations repairers, not a single well has been left out of action. [Text] [Baku VYSHKA in Russian 3 Nov 84 p 1] 9136

ABOVE PLAN PRODUCTION--The collectives of the Soyuzuzbekgazprom VPO [All-Union Production Association] are greeting their professional holiday, the day of the oil and gas industry workers, with a glorious victory. Over eight months, they have achieved above-plan production and realization by 3 million rubles including 37,000 tons of oil and gas condensate. The Mubareksk gas processing plant has processed more than 200 million cubic meters of gas above its quota. Above 90 percent of the accretion of production was obtained from a growth in the productivity of labor. The highest achievements in the competition were obtained by the PO [Production Organizations] Mubarekgazdobycha, the Mubareksk plant, and the production associations Uzbektransgaz and Uzbekburgaz. All the industrial enterprises of the Uzbekneft PO [Production Organization] successfully coped with the eight month assignment. The oilmen obtained more than 18,000 tons of oil and 24 million cubic meters of gas above the established plan and realized above plan production by one and a half million rubles. The assignment for the productivity of labor was fulfilled by 102 percent. The plan for the production of national consumer goods was overfulfilled by a factor of 1.5. Already in April they have fulfilled the plan for four years of the five-year plan for turning over operational wells to the oilmen. [Excerpt] [Tashkent PRAVDA VOSTOKA 2 Sep 84 p 1] 9136

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COAL

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MINISTER SURVEYS DONETS OPERATIONS

Moscow IZVESTIYA in Russian 4 Dec 84 p 2

[Article by N. Grin'ko, minister, Ukrainian SSR Coal Industry: "The Fate of Donets Coal"]

[Text] Vladimir Ivanovich Ignat'yev, working face brigade leader at the Krasnolimanskaya Mine, Kransoarmeysk Coal Production Association recently phoned me and said: "Only the smallest trifle separates the brigade from its promised million tons. We will fulfill our obligation ahead of time."

When you read these lines the brigade will already be reporting the attainment of this noted mark. I am happy for the mine brigade leader, whom I have long known, for his lads and for the Kransolimanskaya Mine, a progressive one, which, for 20 years has had the same director, Vasiliy Fedorovich Vereshchagin, a war veteran and a winner of many military and labor awards.

In general, one should note that the Krasnoarmeysk Coal Association is one of those units in the Donbass which have been developing harmoniously for several decades. In addition to the Krasnolimanskaya, which was built at the end of the 1950's, the Mine imeni A. G. Stakhanov, the largest in the basin, began here 10 years ago. It produces 8,500 tons of fuel daily and belongs to the new generation of coal enterprises in the oblast. Another mine of the future, the Krasnoarmeyskaya-Zapadnaya, is being constructed here. Its daily extraction will be 7,000 tons of coal. The association also has old enterprises, including the Mine imeni Shevchenko, which is being depleted. Its collective is moving over to work at the Krasnoarmeyskaya-Zapadnaya as soon as it is put into operation.

Briefly put, in contrast to their comrades from many other associations, miners in the Krasnoarmeysk Coal Association are not being asked the question: "How can miners work more?". This is a problem for many others. It is by no means a simple one, because for workers in the sector it sums up a whole series of subproblems. The main ones include: is there still coal, so essential to industry, underground in the Donets area, what is the future of the Donbass, should the fuel from the first national "coal pit" be opposed to coal from other basins, etc.?

So, we will answer questions which sum up the problem of Donets coal. First of all we note that this coal was the country's sole energy base for almost 150 years of its technological development. During this time miners worked several

comparatively thick seams lying close to the surface. The technical reequipment of mines and expecially the appearance of highly productive complexes in the past two decades completed their extraction (at least in regions which have long been in operation). However, one cannot conclude that the Donets has run out of coal! It is there, but one must go to considerable depths for it.

Every year, miners in the Ukrainian Donbass produce a sizable share of the country's solid fuel. For them the Donbass is not simply a coal pit, but a land of labor and military feats and the motherland of the Stakhanovite movement. This must be taken into account. Nevertheless, not emotional considerations, but sober economic calculations must be brought up in discussing the development prospects for the Donbass. Sooner or later the reserves of any basin will be exhausted. It is therefore very important to make a timely determination of choices for development paths, based upon general national interests.

The Donbass, stretching from the Dnepr River to the Tsimlyanskoye Reservoir and totalling more than 60,000 square kilometers, has worked out mines only in its older parts. In spite of many years of intensive exploitation, our basin's reserves of high quality coking coal and anthracite (other basins have no anthracite) are still far from exhausted. Total explored reserves are estimated at 55 billion tons. Their distribution is: 19 percent within the boundaries of operating mines and 14 percent are reserves prepared for new mine construction and the reconstruction of operating units. Thus, 37.5 billion tons, or 67 percent of the basin's coal wealth has not yet been industrially developed.

Metallurgical demand for caking coals is steadily growing as metal production increases and the problem of smelting pig iron without coke has not yet been solved. Because Donets mines have no potentials for sharply increasing the extraction of coking coals, in recent years coke and chemical plants in the European part of the country have started obtaining raw materials from the Kuzbass [Kuznetsk Basin]. Its amounts are small compared to that produced by Donbass miners. However, they are sufficient for some specialists studying problems in the country's fuel and energy complex to initially propose and then begin to actively advocate the economic advantages of hauling in Kuznetsk coal compared to local coal.

It is true, the Donbass is not in a position to completely meet the coal needs of the European part of the country. That is its misfortune, but not its fault, for the reduction in fuel extraction was, on the one hand, a result of increasingly difficult conditions for working seams, and, on the other, a consequence of insufficient allocation of investments and material-technical resources for maintaining production capacity, to say nothing of increasing it greatly. For 20 years the modernization of mines, especially in the Donbass, has been proceding at very slow rates. The exhaustion of capacity is now exceeding its growth. Mines are aging, a large share of them have not been rebuilt for 20 and more years and most extraction is now from thin and very thin seams which yield their coal only with increasing difficulty. These facts are used to justify the insufficiently high profitability of Donets coal.

In the next three five-year plans it will be essential to allocate, at the proper time, capital investments sufficient to sink new mines with a total capacity of 35-40 million tons. If the Kuznets alternative is taken and

appropriations are reduced this would lead to a 60-75 million ton reduction in Donbass production by the year 2000, including a 27 million ton reduction in very scarce anthracite.

Here is why. First, large volumes of construction-installation work in the Kuznetsk Basin will require a sharp increase in the capabilities of construction organizations. According to economists' studies, the number of personnel should be increased by 110,000-140,000. Their movement and settlement will require an additional 1.5 billion rubles. Second, before we begin the forced pace construction of new enterprises it is necessary to set up a material-technical base for construction organizations and create a modern social infrastructure for their workers, which will also cost billions. Third, the transportation of Kuznetsk coal requires the expansion of railroad transportation. According to specialists' estimates, this will cost from 1.7 to 3.6 billion rubles. We note that even after being hauled to the country's center or to the Ukraine, a ton of Kuznetsk coal will cost from 17 to 22 rubles, that is, about the same as a Donets ton.

One should also keep in mind that the problem of deep mines, which first affected Donbass mines, will, in the not too distant future, arise in the Kuzbass too. Mining geological conditions there will be just as difficult and outlays for their solution will be no smaller. Who will then haul coal from the Kuzbass to the Center which will be priced comparably with Donets coal?

It would be incorrect to think that Donbass coal miners are not doing anything on their own to work better, but are only waiting for the centralized allocation of billions. Scientists and designers involved in all preparatory and extraction operations (sinking shafts, cutting longwalls, degassing seams, extracting fuel and filling in worked out spaces with rock) have developed and tested a new generation of highly productive equipment. Mining machinery developers are producing even more improved mechanized complexes and frontal units. In accordance with USSR State Committee for Science and Technology targets the Donbass's first automated manipulators and machines are now being introduced at the Krasnoarmeyskaya-Zapadnaya Mine now and should be completed by 1990.

Donbass engineers are searching for ways of more effectively using solid fuel. A way has been found to burn high ash coal which was previously not used. This has been done through the installation of a special grating with forced draft ventilation. A fluidized bed, long known in physics courses, is installed in the furnace, where high ash fuel is burned.

It is calculated that just the rebuilding of furnaces in the Ukraine would save 3.5 million tons of coal annually. Nothing might have been said about this discovery by engineers. However, electric power plant workers frequently complain to Donbass miners about fuel ash content, which sometimes increases because miners have to work mainly thin seams and rock cannot be completely excluded from coal.

Metallurgists also need to find ways of reducing coke use and thus the hauling of Kuznetsk caking coals. Unfortunately, the technology for blowing dry burning

coal dust into blast furnaces, developed by scientists at the Donetsk Scientific Research Institute for Ferrous Metallurgy and which worked excellently at the Donetsk Metallurgical Plant, is no longer used, although it makes possible the saving of 100 to 600 kilograms of coke for each ton of pig iron smelted.

The technology for producing formed coke from a mixture of gas and poorly caking coals is very progressive. It was developed by scientists in the Ukraine and has successfully undergone industrial testing at the Kharkov coke and chemical plant. A raw material base has now been found for obtaining formed coke from coals at the Pavlograd Coal Production Association. The Pavlograd TsOF [Central enrichment facility] is now being rebuilt so that by 1985 it can meet metallurgists' demand for coal concentrate. However, the Ministry of Ferrous Metallurgy is slow in introducing capacity for the production of formed coke. Of two installations, only one is being built -- at the Bagleyskiy Coke and Chemical Plant. It should have gone into operation back in 1984. Less than half of the 48.5 million rubles worth of construction installation work has been completed.

The difficulties in the Donbass will, nevertheless, be overcome. Very important governmental decrees have been approved concerning the further development of the coal industry. The region's role in the USSR Energy Program has been determined and production plans stabilized. As previously, Donbass workers are doing much in this regard. There are now 92 one thousand ton brigades working at mines in the Ukraine. Nineteen brigades are extracting 500,000 tons and more from a work face annually. It is remarkable that 40 brigades have 1,000 ton daily loadings from thin and even very thin seams.

The glory of the Donbass should be increased even more, and, as you see, there are possibilities for this.

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IMPROVEMENTS IN MINE DEVELOPMENT DISCUSSED

Moscow UGOL' in Russian No 11, Nov 84 pp 6-9

[Article by K. K. Kuznetsov, Tsentrogiproshakht [All Union Central State Planning Institute for the Coal Industry]: "On Improvements in the Opening up of Coal Deposits"]

[Text] Problems in improving the opening up of mine fields have a leading place in the theory and practice of underground coal mine design. The parameters of such opening work to a great extent determine the techno-economic indicators for enterprise construction and operation. Together with mine capacity and mine field size they are the most constant throughout a mine's service life and, as a rule, cannot be changed without sizable capital investments. The responsibility of mining science and planning organizations for their their substantiation have grown substantially, as possible technological errors in solving these fundamental problems can cost millions of rubles.

Mining science, especially Soviet, has extensive experience in this area. This is reflected in the works of the most noted scientists: B.I. Bokii, L. D. Shevyakov, A. S. Popov, P. Z. Zvyagin, A. P. Sudoplatov, D. F. Borisov and others.

Based on scientific recommendations and practical experience, the main directions for technical policy in the coal industry have been established. Over the next 30 years they are oriented primarily towards the creation of large, highly mechanized mines. Planning institutes' efforts are also directed towards the development of such mines.

The planning decisions worked out and implemented are, to a great extent, determined by the potentials of existing technology and series produced equipment as well as by the peculiarities of mining geological conditions. For the Donbass, for example, this means work at great depths, the development of seams with high gas content and rock pressure, sudden bursts of coal, rock and gas, high wall rock temperatures, thin seams and relatively low amounts of coal.

Taking these fundamental factors into consideration, the Mining Institute imeni A. A. Skochinskiy, Tsentrogiproshakht and other institutes have worked on techno-economic substantiation and the determination of parameters for the block method of opening up mine fields. This method of opening up has found wide use in the planning and construction of large mines in extensive deposits with methane bearing beds. The advantages of dividing a mine field into blocks, the individualized ventilation of each one and their underground linkage to a main shaft for the haulage and hoisting of coal and freight have been supported by many specific designs, first of all in the Donbass. At such enterprises there have been considerable increases in the size of fields along the strike, planned capacity has been increased to 3.6-7.5 million tons of coal annually and the relative volume of mine workings (per 1,000 tons of coal extracted) has been reduced from 340 to 230 m³.

Note that the opening of mines with division into blocks increases their size: 4-5 km along the strike and 1.5-2 km along the dip (for example for mines built and under construction using Dongiproshakht plans). It assures these mines' stable operation without any additional capital investments or major mine improvements. This is especially important for operating mines.

In the planning of new large mines great attention is given to improving the surface facilities. This is directed toward combining production units, the zoning of industrial, administrative and service installations, with their maximum blocking within zones. A unified compact surface reduces coal losses in pillars, considerably reduces facility area, improves the layout factor and reduces the amount of land removed from agricultural use. The construction of centralized boilers, pollution control units and rock receiving points solves important national economic problems in environmental protection.

At the same time, we note that in some conditions comparatively small mines (600,000 - 900,000 tons annually) which are completely justified have been designed and built. There are instances in the coal industry where there have been unjustified increases or reductions in mine capacity. This has a negative effect on these enterprises' operations and their techno-economic indicators. For example, in 1977, the Raspadskaya Mine, South Kuzbass Coal Association, was put into operation. Its planned capacity was 7.5 million tons of coal annually. During 1981-1983 the mine's capacity was only 80-85 percent utilized. Considerable difficulties in reaching capacity also arose at the Mines imeni A. G. Stakhanov, Krasnoarmeysk Coal Association and the imeni A. A. Skochinskiy, Donetsk Coal Association.

Obviously, a mine's planned capacity, the opening up scheme, other engineering decisions and the main parameters selected should be optimal and based on comprehensive techno-economic research and development, using modern mathematical economic methods and computers. An example of this is the Vorgashorskaya Mine No 1, Vorkuta Coal Association. Its planned capacity was initially intended to be 2-3 million tons. Later, as a result of optimization calculations made by Tsentrogiproshakht, this was raised to 4.5 million tons. The mine not only reached its planned capacity ahead of time, but substantially exceeded it. Labor productivity per worker in extraction at this mine (averaging 150 tons per month) is 2 fold higher than for the association and prime cost for the extraction of 1 ton is 2 fold lower.

The stress towards increasing mine capacity is explained by the large economies and is characteristic of progressive coal extracting countries. Thus, in the past 20 years, average daily loadings per mine have increased 63 percent in France, 100 in Great Britain, 110 in the FRG and 150 percent in Poland. In 1982 in these countries average daily loadings per mine (administrative units) were 3,600, 2,320, 10,400 and 11,700 tons of coal respectively.

Large enterprises are being designed and built abroad, such as the Selby Mine (Great Britain) with an annual capacity of 10 million tons of coal, the Piast (Poland), 7.2 million tons, and others. In the FRG operating mines are being consolidated into large production units. For example, the Patberg, Rosserhein and Rheinpreussen mines, which could not work seams economically on an individual basis, were combined, by connecting tunnels, into one enterprise, the Rheinland extracting 45,000 tons of run-of-mine coal daily. The concentration of extraction reduced production outlays and improved profits [1]. The General Blumental Mine is a similar example. It has been linked to the field of another mine located 5.6 km away and connected by an underground automated electric hoist. Research in the FRG is oriented towards the creation of large enterprises when new mines are built. Thus, according to [2], for new mines the optimal daily capacity of single surface facilities should be 20,000 tons of coal.

Results from broad scientific research and many years of domestic and foreign practice lead one to conclude that the opening up of mine fields should above all assure the following: highly concentrated mining operations, with mine, horizon, seam, slope and working face loadings appropriate to mining geological conditions; the minimal essential volume of driving and support workings; the timely replacement of depleted working face lines; as a rule, the continuous haulage of freight and direct ventilation; the construction of mines and the preparation of new horizons in minimal time; the reliable and stable operation of mines in one horizon for a period of 10-15 years with minimal volumes of major capital operations during this time; stable quality levels of commercial output.

These requirements are, to varying extents, reflected in the design and construction of coal mines. However, in spite of long term scientific work on these questions, there are still no solutions to many aspects of the problems, such as mine production capacity, the selection of opening methods and flowsheets, the size of mine fields and elements.

Thus, at the mine fields in Prokop'yevsko-Kiselevskiy Rayon in the Kuzbass it was assumed that there was a lot of coal in a small area. This led to the permanent preparation of new horizons. In the transition to working reserves at 400-500 meters a sizable share was left in the pillars to protect the deepened and newly driven shafts and tunnels. For the deepening of the Koksovaya mine to the 135 meter mark there will be 12 shafts and 7 surface facilities for a mine field area of 4.2 hectares. This is a consequence of insufficiently substantiated engineering decisions.

The opening layouts at a number of mines in the Donetsk, Kuznetsk and other basins with small mine fields and limited coal reserves in horizons makes

necessary very frequent deepening of shafts and the preparation of new horizons. As a result, major delays in the deepening of existing and the sinking of new shafts to open and prepare the next horizons, the mining operations at many mines shifted to dipping fields with multistage transport. Compared to 1970, the number of inclines per mine in the USSR Ministry of the Coal Industry has increased more than 3 fold. The figures for some basins are: Donets -- 4.5 fold, Kuznetsk -- 2, Karaganda -- 2.6 and Pechora -- 1.7.

The development of enterprises at a new techno-economic level, assuring considerable improvements in the efficiency of capital investments, labor productivity and production obviously requires qualitatively new decisions in opening up mine fields which will simplify, as much as possible, the spatial network of mine workings and the flowsheets for mining operations. The proposals of Academician V. V. Rzhevskiy concerning principles for the opening of coal deposits are of definite interest in this regard [3].

The author thinks that large block mines are only advisable under favorable mining geological conditions. In all other cases it is essential to substantiate mine type and capacity and reserve preparation conditions.

The theoretical prerequisites elucidated in [3] can, for the most part, be reduced to the following:

The opening of reserves by major [kapital'nyy] workings of minimal cross section (depending upon conditions), opening reserves from the surface and assuring their yield, with subsequent step by step opening through increasing reserves, capacity and service life of the enterprise, with the expanded sphere, number and cross section of workings. It is proposed to restructure the system of shaft sinking operations. This means organizing the drilling of large diameter (2-3.5 m) bore holes, or sinking small cross section shafts instead of driving a large number of horizontal and inclined workings. The goal here is to minimize the work volume involved in driving horizontal and inclined workings;

The division of reserves into 300x150m stoping blocks which are worked for about a year through shafts (bore holes) and simplified work areas for each block. It is proposed to build the surface facilities for each block from light weight and portable structures. For large deposits it is proposed to simultaneously work several stoping blocks (to reach planned capacity for the mine), each of which perform individual functions for preparation, stoping and haulage. In an extreme case, the size of the stoping block will correspond to the mine field.

In order to compare and analyze the size of operating blocks in specific mining geological conditions and to select flowsheets for preparing reserves for extraction, use is made of a coefficient of opening, equal to the ratio of the total volume (clearance) of major opening vertical and seam workings to the total extracted of coal uncovered through these workings.

Based on these prerequisites, Academician V. V. Rzhevskiy provides basic flowsheets for opening each block by one shaft of minimal diameter which will obviously perform all functions for hoisting coal, rock, lowering and hoisting workers and materials, energy supply and water for slurry fill.

In a modern mine a considerable share of total facilities are on the surface (more than 25 percent of estimated cost). To a great extent these outlays determine the techno-economic efficiency of the enterprise planned. The type of mine proposed by the author of [3] makes practically no provision for installations and transport, even though they can have various engineering solutions, especially for block-shafts, truck, train and slurry transport. It seems completely unrealistic to us to transfer these functions completely to each "block-shaft", of which there is planned to be a large number in the mine.

Special attention should be given to ecological problems in working out and implementing tasks in coal mine opening. The considerable number of shafts (blocks) being simultaneously operated and prepared and the extensive utilities ties between them require the use of large amounts of land for surface facilities, transport, etc.. This is now causing great difficulties and requires sizable capital investments for compensation and restoration. Moreover, it removes a lot of land from agricultural use. The article examined has no recommendations on these questions, although they are of fundamental importance in the proposed layout for opening-up and in the determination of parameters.

Academician V. V. Rzhevskiy's variant for working reserves in "block-columns" for a field with 50 million tons of reserves and mine capacity of 1 million tons requires sinking 3.4 km of vertical workings (shafts or wells) annually and which have service lives of 1 year. In a complex mining enterprise the vertical shaft has a special position as the most important engineering installation. Mine construction experience shows that the shaft preparation and construction period takes up 30-50 percent and more of total mine construction time.

For the immediate future one can hardly count on the use of high speed large diameter drilling to help solve problems in mine opening. Wells drilled by turbodrills and lined with metal tubes are now used in the coal industry mainly for ventilation. This is because it is difficult to assure the vertical position of such holes when they are supported by existing methods.

From the experience of the Ukrainian SSR Ministry of the Coal Industry's Spetsshakhtobureniye [Special Mine Drilling Trust] we know that the drilling of 3.2 m diameter shafts 500 m deep requires 600 days, of which 90 days are preparatory work. Since the prospective coal bearing sections in the Donets Basin are 1,000 m and deeper, in the Pechora -- 800-900 m and in the Kuznetsk and Karaganda Basins 600-700 m deep, it takes about 2 years to drill shafts of this diameter. In V. V. Rzhevskiy's variant for opening reserves by block-shafts, the service life of such shafts is about one year. In view of the time and cost (about 2 million rubles) of sinking such holes (shafts) 500 m, the efficiency of block-shafts is far from indisputable if one makes economic evaluations using adjusted costs and not for the duration of workings.

Experience in drilling shafts using domestic equipment (UZTM)[not further identified] and machines from the Wirt firm (FRG) has not yet had major positive results. However, work should continue in this promising direction.

Academician V. V. Rzhevskiy's scheme for opening seams has essentially no connection with the technology and equipment for working reserves, although, as is known, they have a decisive influence upon all basic elements in opening. It is quite obvious that one can not use the block-shaft method for opening only on the basis of existing equipment and technology (especially in mines with gas and danger of sudden bursts), simply because with only one shaft their is no normal ventilation or extra exits, as required by Safety Rules.

If existing equipment is used, even in small blocks (300x150 m) drift cross section should not be determined by the conditions of driving them, but by conditions for the normal operation of stoping machinery and ventilation. Domestic and foreign practice and numerous studies show that the pillar free stoping and the repair free support of workings require that haulage drifts have cross sections of 12 m^2 and more, and not 6 m^2 as the author of [3] thinks.

Thus, the opening scheme proposed by Academician V. V. Rzhevskiy has obvious fundamental difficulties with regard to existing equipment and technology. Neither has he shown any real alternative engineering and technological solutions which would make it possible to introduce such schemes.

It would be premature to consider that the author of the article reviewed has shown the effectiveness of replacing existing opening schemes with new ones over a wide range of mining geological conditions. Their lack of careful design work prevents sufficiently accurate judgements about the proposed amount of work and the economies obtained. For example, there does not seem to be any basis to Academician V. V. Rzhevskiy's statement that opening "by blocks" does not require the construction of facilities near shafts. Any form of transport -- conveyor, rail, slurry or pneumatic requires special areas and rooms near shafts, while the reception of materials and equipment requires special areas right near a shaft.

The data in article [3] on the volumes of tunnel driving work to open reserves (to extract 1 million tons of coal) and the size of the operating blocks are based on ideal conditions. They give no consideration to the amount of environmental protection work (of decisive importance in the "block-shaft" variant proposed by the author), outfitting of shafts and the installation of a large number of surface complexes (for receiving and moving coal, servicing workers) etc. If the cost of such work and facilities and the cost of land used is included in specific designs then there might be no support for the conclusions, and in some cases the opposite results might be obtained.

In our opinion, the proper practical realization of the theoretical prerequisites in article [3] requires the implementation of a complex of design and research measures in the following theoretical and practical directions:

1. Substantiating the area for the effective use of various types of mines (individual, blocks with connections underground or on the surface, underground mines -- open pits, etc.). For a number of years now, Tsentrogiproshakht, as the head institute for the problem, has been doing extensive work on design automation. It has created and operationally introduced the first section of a system for the automated design of coal mines and is further developing it. The use of present and future components of this system for computer assisted

multivariant planning could solve problems in the selection of types of mines and basic opening parameters for various mining geological conditions. There should obviously be a reexamination of the types and capacities of mines in different coal basins. In the Donbass, it seems advisable to, as a rule, design individual mines with annual capacities of 1.5-2 million tons. If conditions are favorable, large block type mines simultaneously working the blocks should be built in the Kuznetsk, Karaganda and Pechora Basins.

2. The development of flowsheets and design components for opening various types of mines, including opening by "block-shafts" for characteristic mining geological conditions. Flowsheets should completely meet the requirements of Safety Rules, Technical Operating Rules, norms for technological design and construction norms and rules.

3. The working out of fundamental decisions for high speed drilling and the outfitting of large diameter vertical shafts in sinking small cross-section shafts. The coal industry has not yet acquired sufficient experience in the drilling of mine shafts. However, because this is a promising and progressive direction, solutions should be found to the problems of supporting and outfitting shafts (bore holes). The practical implementation of the proposals in [3] will depend upon solutions to these problems. Tsentrogiproshakht's work on reinforcement without shaft enlargement and the use of mobile lifts might have great prospects for opening coal deposits by bore holes and small cross section shafts.

The results from such research and development work could serve as the basis for substantiating materials or techno-economic substantiation of designing and building various types of mines.

Domestic and foreign experience in coal mine design and construction acquired with the development of engineering and improvements in coal extraction technology, on the whole, support the opening of mine fields in a manner to assure the long term operation of large mines on one horizon with minimal volumes of major work during the period.

At the same time, the possibility of improving the engineering and technology of mine construction and operation and the need to further improve the efficiency of mining operations in deteriorating mining geological conditions make necessary further scientific research and design work to improve opening and to prepare the reserves of new mines and horizons and those under reconstruction. This work should be directed towards finding qualitatively new technical solutions assuring a 2-3 fold reduction in the time needed to build mines and prepare new horizons, sizable reductions in work volumes and improvements in labor productivity in the construction and operation of such enterprises. It is simultaneously necessary to improve the engineering, technology and organization of work in all mining excavation to increase speed and to solve problems in repair free support throughout the entire service life.

Some of the principles proposed by Academician V. V. Rzhevskiy probably could, after detailed design refinements and optimization of engineering decisions, be used to improve schemes for opening comparatively small coal reserves at not too

great a depth (mainly in individual sections which could not be effectively opened and worked by traditional technology). However, it does not appear possible to apply these principles to all coal deposits given the standards of engineering, technology and work organization at present, and possible in the near future.

I think, that in spite of its having the nature of a discussion, the article by Academician V. V. Rzhevskiy has raised concern about solutions to fundamental tasks in opening coal deposits and has focused the creative searches of scientists, designers, planners and production workers specializing in mining.

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COAL

BRIEFS

KATEK POWER PLANS CHANGE--Moscow, 12 Jan (TASS)--The Kansk-Achinsk coal deposits in eastern Siberia will begin to be used for power generation this year when the first 500 thousand kilowatt unit of Berezovskaya-1 power station is put on stream. The station will have eight similar units. The coal basin extends 800 km along the Trans-Siberian railway; it has over 200 deposits suitable for open-cast mining and can yield up to 1 billion tons annually which is one-third of world production. However, the low calorific value of the brown coal makes transporting it uneconomic. Originally, it was proposed to use half of the coal in Siberia and to use the other half to generate electricity locally which would then be carried by power lines to the European part of the country. However, in view of AES construction in central regions it has been decided not to build 12 power stations but only 2 or 3 of the same size as Berezovskay--6.4 million kilowatts. Plans are not being drawn up for enterprises to make integrated use of the coal; they will have plants which combine coal processing, power stations, and chemical works. Scientists have proposed a method for integrated electro-technical processing of brown coal which can be used to obtain coke, gas reducer [gaz-vosstanovitel] for metallurgy, liquid fuel, and various chemicals. [Summary] [Moscow TASS International Service in Russian 0611 GMT 12 Jan 85 LD]

CSO: 1822/154

ALTERNATE FUELS

GROWTH OF SHALE EXTRACTION DESCRIBED

Moscow UGOL' in Russian No 11, Nov 84, pp 15-16

[Article by E. Ya. Reynsalu, candidate of technical sciences, Estonian affiliate of IGD [Mining Institute] imeni A.A. Skochinskiy: "Concerning the Expansion of Production of Oil Shale in the USSR"]

[Text] The oil shale industry of the USSR is an important element of the fuel and power base of Soviet industry. Although the fraction of the annual shale production (33.1 million tons) is less than 1 percent of the overall fuel balance of the nation, this form of mineral is of national importance as an important component of the fuel and power base of the Northwestern and Baltic economic regions, that are poor in other energy resources, and is significant as raw material for production of synthetic liquid fuel. The latter takes on special meaning as existing oil wells are depleted and drilling sites that are being reactivated retreat further to the east.

The prospects for development of oil shale are evaluated by the "social usefulness of the deposit," which depends on the economic and geographic conditions of the region, the mining and geological conditions of exploiting the site and the quality of the deposit. By economic and geographic conditions we understand the set of characteristics which can in the first analysis may be described by the population density, by the long-run marginal costs [zamykayushchiye zatraty] for fuel and the size of the overall geological reserves of shale in the area of the deposit. The mining and geological conditions for exploiting the deposit and its individual sections are evaluated on the basis of the depth of the deposit and the thickness of the shale stratum. The quality indicators for oil shale are the specific heat of combustion, yield of tar and total sulfur content.

The population density characterizes the region in terms of the degree of its development and the importance of environmental protection issues. Both small or large population densities on the territory of a facility being constructed are a negative factor. Economic and geographical conditions corresponding to a certain value, should be viewed as being optimal. Hence, the curve relationship for the deposit's utility plotted against the variable "population density" has the form of a parabola with its maximum in the middle of the range.

The relationship between the social utilty of oil shales and the long-run marginal costs for crude power in the region of intended production and the overall geological reserves of the deposit is described by an increasing linear function.

The chief mining and geological characteristics that govern the bulk of production costs are the depth of the deposit and the thickness of the stratum. At coal and shale mines, the net costs and capital intensity of the production represent the increasing functions of occurrence depth and decreasing functions of stratum thickness. Based on this, with an error allowance to serve as a generalized argument of the function of the deposit's utility, we can use the logarithm ratio between the depth of deposit and the thickness of the shale bed.

The social utility of developing oil shale is in direct proportion to such qualitative parameters as the specific heat of combustion and tar yield, and inversely proportional to the total sulfur content.

Averaged estimates of the social utility have been used to classify oil shale deposits in terms of their development prospects. This classification identifies developed and prospective deposits. The latter are broken down into primary, secondary and tertiary category prospects. Developed deposits include the Estonian, Leningrad and Baltic Basin. It should be pointed out that exploration has been quite intense here and no increase in the overall geological reserves is expected.

Exploitation of the prospective top category deposits using traditional methods of excavation and dressing can be started in 15 years at a minimum. This group includes the Tapa shale region in Estonia, the Boltysh deposit in the Ukraine and a number of sections of the Volga Basin. Since the Tapa region is basically a peripheral segment of the Estonian deposit, characterized by substantially worse technical and economic exploitation indicators, its development is advisable only after the reserves of the main sections of the Baltic Basin have been depleted.

The anticipated development of secondary prospective deposits is possible by using such new excavation methods as in-sitv gasification and distillation of the shale. It is scheduled for implementation after the year 2000.

Development of tertiary deposits requires additional geological prospecting and scientific investigation to determine the actual reserves of organic substance in the oil shales and efficient methods of extraction. If the research findings are positive, development is possible simultaneously with the secondary prospects.

Thus, by the end of the current century the development of the shale extraction industry is feasible only in the Baltic Basin. Rapid economic exploitation of the oil shale reserves in other USSR basins is prevented by their poor quality, complicated mining and geological conditions of the deposit and lack of efficient processing technology. Taken together, these factors dictate the unprofitability of shale as compared to natural gas and petroleum at present.

Despite the fact that the chief factor determining the volume of excavation and the technical and economic status of the shale industry is the demand for electricity and shale refining products in the Northwestern and Baltic economic regions of the USSR, the mining technology, labor and ecological resources of the basin also play an important part. The combined influence of these factors has been studied with the aid of a mathematical model built to optimize the shale production structure by the linear programming method. As a result of simulating various alternatives of development of the Baltic Basin up to the year 2000, a number of recommendations have been developed to optimize the existing and prospective structure of shale production. Since the major factor limiting extensive development of shale production is the labor resource, enhanced labor productivity requires conversion to mechanized and integrated-mechanized mining methods. The adoption of new mining technologies can reduce the shale processing losses by 10-13 percent. However the integrated-mechanized mining technique chiefly produces fine shale unsuitable for thermal refining in generators. Moreover, this shale has a lower heat of combustion. Consequently, reduction of labor costs in in-situ shale excavation requires the parallel resolution of the shale grade problem and quality of the commercial product. There are two possible methods. The first is to increase the volumes and to develop efficient shale dressing methods. This requires the construction of dressing plants at prospective and operational strippings (Sirgala, Narvskiy) to produce large chunk shale for the shale refining industry. At re-opened mines it is necessary to provide a thorough dressing of the rock to increase the heat of combustion of fuel shale. Both methods result in increased capital investments and production costs during extraction, i.e. increased wholesale prices of the shale.

The other method involves developing a technology of thermal processing for fine shale and construction of boiler units to burn it. This is accompanied by an increase in capital and operating costs in the sectors making use of the shale. Since available data indicate that only the Baltic shale is easily cleaned and dressed, the prospect for low-quality mineral fuel largely depends on future economic interests.

Development alternatives for the Baltic Basin have been worked out from forecasts. One alternative, corresponding to the actual mining and technological and crude mineral resources of the basin, envisions the construction of three mines and two dressing plants in Estonia (at the Sirgala and Narvskiy quarries), as well as mines and quarries with a beneficiation plant in the Leningrad Oblast. The number of workers involved in shale extraction will be greatly increased. But given the limited labor resources in these regions a more feasible alternative may be construction of the Kuremyae mine at the Estonian deposit, and construction of the Kirovskaya mine and the Mezhdurech'ye quarry with a dressing plant in the Leningrad region. No significant increase in workers is anticipated, but the net costs of shale extraction increase.

Thus, the alternatives of development of the Baltic Basin envisioning the adoption of progressive technologies for the cleaning and dressing do not guarantee improvement of all technical and economic shale extraction

indicators. An objective factor--worsening of the mining and geological conditions--causes increased production costs and lower quality of extracted fuel. The construction of new mines and quarries requires significant capital investment. Re-tooling only increases the labor productivity. However, as indicated by the dynamics of change in the long-run marginal costs for fuel and power raw material in this economic region, the economic effectiveness of developing the Baltic oil shale is increasing and will surpass the current level by the end of the period under discussion.

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OTHER SOLID FUELS

EFFICIENT USE OF BSSR'S DRUT'-BEREZINA PEAT RESERVES DISCUSSED

Moscow TORFYANAYA PROMYSHLENNOST' in Russian No 9, Sep 84 pp 12-14

[Article by A. G. Dubovets, engineer, Institute of Peat, Academy of Sciences, BSSR: "Peat in the Economy: Quantitative and Qualitative Changes in Peat Reserves as a Result of Economic Activity."]

[Text] For about 50 years peat deposits in the BSSR have been the target of economic activity, the intensity of which has been steadily growing. Moreover, changes in the composition of the peat reserves have been unavoidable. These changes have been caused by the fact that peat deposits with various characteristics are used in diverse ways in the economy. An accounting of these changes is necessary not only for an objective economic evaluation of the peat reserves at the present time, but also for a well founded forecast of their efficient use in the future.

Table No. 1

Characteristics of peat reserves	Interfluvial peat region			Region Average
	northern	central	southern	
No. of peat deposits	184	429	152	765
Area of peat deposits (within the limits of a "0" deposit), thousands of hectares	15.3	74.4	35.5	125.2
Portion of the territory with peat, percent	7.9	10.0	15.3	10.7
Land reclamation of peat sites, percent	60.5	36.4	81.2	52.0
Depletion of peat sites, percent	24.8	8.3	15.7	12.4

[Table continued on following page]

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Characteristics of peat reserves	Interfluvial peat region			Region Average
	northern	central	southern	
Original supply of peat, millions of tons	33.4	177.7	94.5	305.6
Remaining supply of peat (with consideration for mineralization loss), millions of tons	25.4	157.2	78.7	261.3
Depletion of supply, percent	23.8	11.5	16.8	14.5

The author did an analysis of the changes in the composition of the peat sites and resources in the region between the Drut' and Berezina rivers, which are located in the eastern part of Belorussia. The region stretches 230 km, fundamentally north and south; it has a width ranging from 40 to 90 km, between the western tributaries of the Dnepr, the Drut' and the Berezina. The Baltic-Black Sea watershed is the region's natural border in the north, the river Dnepr in the south.

In the region between the Drut' and Berezina 765 peat deposits covering 125,200 hectares and possessing original reserves of 305.6 million tons have been identified. Peat is found in 10.7 percent of the region. Peat deposit sites of the region comprise 4.9 percent and original peat reserves of the region, 5.3 percent of overall republic totals.

In view of the geomorphological and hydrogeological variety in the region between the Drut' and Berezina rivers, the peat formation process proceeded variously. These differences led not only to varying degrees of intensity in the process of peat formation but also to qualitative features of the peat reserves. Therefore, the region between the rivers has been divided into three peat regions: the northern, the central and the southern regions. Each of these is distinguished by the extent of its peat formation and the typological composition of its deposit sites and peat resources.

General features of the Drut'-Berezina interfluvial region peat reserves are presented in Table 1. The data show that from the outset of their development, reclaimed peat sites in the southern peat region have had the most relative importance, and those in the central region, the least. The northern peat region in this regard has occupied an intermediate position. Comparison of the data presented in Table 1 with the typological composition of the peat sites before their development leads one to the conclusion that the relative importance of reclaimed sites of peat reserves has a close correlation with the relative importance of valley peat deposits. For example, in the southern region valley peat deposits comprised 92.7 percent of the total, and in the

same region 81.2 percent of the peat reserve sites were reclaimed. In the northern peat region these percentages were correspondingly 68.6 and 60.5 percent, and in the central region, 44.9 and 36.4 percent. These comparisons indicate that in the Drut'-Berezina region primarily valley peat deposits were reclaimed and used, while highmoor and other types of deposits have been exploited very little.

As a result of the economic activity in the Drut'-Berezina interfluvial region, notable changes have taken place in the profile of peat sites remaining in their natural state. Highmoor-type deposits occupy a sharply more important part. If in the original northern region sites, highmoor peat deposits comprised 22.7 percent of the total, then in the present composition of deposits remaining in their natural state highmoor deposits exceed by a factor of three the valley peat deposits.

An analogous tendency, albeit more muted, is apparent in the composition of the remaining geological supplies of peat. However, this tendency will become more marked in the future due to the influence of three factors. In the first place, valley peat deposits will be exploited more intensively in contrast to deposits of other types because substantial amounts of peat are extracted for fertilizer and for the production of fuel briquets.

Secondly, at present about 40,000 hectares of reclaimed valley peat sites are being utilized for agricultural purposes. Moreover, substantial losses of peat due to mineralization are unavoidable in the process. According to N. N. Bambalov's data, peat losses due to mineralization are 3.6 t/h per year on average is when land is in hay crops and pasture and 7 t/h when it is annual crops. Calculations done on the basis of these data show that the total loss of peat in the interfluvial region due to mineraliation is about 200,000 tons per year (see Table 2).

Table No. 2

Interfluvial region	Meadow and pasture area, thous. of hectares	Annual crops area, thous. of hectares	Peat loss from mineralization, thousands of tons/year		
			Meadows and pastures	Annual crops	Total
Northern	3.4	2.6	12.2	18.2	30.4
Central	6.1	5.0	22.0	35.0	57.0
Southern	14.1	8.5	50.8	59.5	110.3

Thirdly, the peat formation process continues at peat sites which are in their natural state. Thus, according to N. I. P'yavchenko's data the yearly increase in peat (assuming 40 percent moisture content) is 1.0 t/h on average. In so far as the area of highmoor marshes in their natural state in the region

at present substantially exceeds the corresponding valley marsh area, the relative importance of highmoor peat supplies will grow.

At present the yearly increase in the supply of peat in the Drut'-Berezina region is estimated to be 62,000 tons. This is lower by more than a factor of 3 than peat loss due to mineralization alone on reclaimed land used for agricultural purposes. In addition, one must note that the primary expenditure of peat reserves in the Drut'-Berezina region is in the direct mining of peat. Four fuel industry enterprises operating in the region take out 1 million tons of peat per year. Local industrial and agricultural enterprises mine about the same amount of peat. Thus, the overall loss of peat in the region in question, including losses from mineralization, is about 2.1 million tons. This total exceeds the natural formation of peat at deposits that remain in their natural state by a factor of 30-35.

The estimate shows that at the present rate of mining all valley peat deposits remaining now in their natural state will be exhausted in 24 years. Of the 1.9 million tons of peat mined at present per year, 72 percent goes for use in the agricultural sector, 14.8 percent for the production of domestic fuel and 11.2 percent for power generating purposes. Consequently, the primary savings of valley peat in the area may be achieved by a substantial reduction of its use in the agricultural sector. Calculations show that by reducing the demand for peat in the agricultural sector by a factor of 2 and prohibiting its use in power generation and the production of domestic fuel, resources of valley peat will last longer--approximately 72 years.

Strategies to reduce peat loss from mineralization have substantial importance in the preservation of peat resources of the reclaimed sites. For example, putting peat soils in perennial grasses reduces losses by a factor of 2 in contrast to utilizing these soils for annual crops. Moreover, this strategy practically eliminates peat losses from water and wind erosion. This will extend the life of peat soils.

Thus, assessment of qualitative and quantitative changes that have taken place in the composition of the Drut'-Berezina peat reserves as a result of economic activity makes it possible to draw the following conclusions and to make the following proposals:

--peat regions which in the past were judged to be regions with a relatively wide distribution of highmoor peat deposits are now regions where highmoor deposits completely dominate. This change in the composition of peat reserves was brought about by the predominant development and use of valley-type deposits in contrast to peat deposits of other types, and this has made necessary a new approach to its economic assessment and use;

--in regions of relatively intensive economic activity peat reserves are in extremely negative balance. The loss rate of peat resources from direct cutting alone exceeds the peat formation factor at deposits remaining in their natural state and is calculated in factors of ten. On reclaimed land under agricultural production, peat losses from mineralization have markedly grown.

For example, in the Drut'-Berezina interfluvial region losses from mineralization comprise more than 10 percent of overall yearly peat losses;

--in connection with the increased losses of peat from mineralization, the author proposes that they be considered in drawing up regional peat reserves balances.

At this time measures for more economical expenditure of valley peat resources are needed. These measures, in the author's opinion, must be:

--reduce the consumption of valley peat for fertilizer by a factor of 2 by improving the quality of this fertilizer;

--prohibit the use of valley peat in power generation;

--switch over household fuel production to other types of deposits;

--reduce to the maximum extent possible peat losses from mineralization and water and wind erosion by utilizing reclaimed peat sites as meadows and pastures sown in perennial grasses.

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NUCLEAR POWER

MINENERGO DEPUTY MINISTER ON NUCLEAR POWER

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[Article by USSR Deputy Minister of Power and Electrification G. Shasharin: "Nuclear Power"]

[Text] The twentieth century has been characterized by an intensive growth in the production and consumption of power in the leading industrial countries. Moreover, approximately 80-90 percent of the total amount of coal, oil, and gas which mankind has extracted and burned during its entire history has been used in the last 15-20 years.

This situation has been caused by an increase in population, the industrialization of the economy, and the growth in the power-worker ratio of industrial and agricultural production and the domestic sphere.

Relatively inexpensive and easily-accessible power fuel resources are nearing depletion in the near future in many countries. Their extraction is now moving into difficult-to-access northern areas in sea shelves and ocean depths.

The production of electrical and thermal power is an integral part of the power fuel complex. Up to the present time, the main, and until recently, the only source for obtaining power was organic fuel: coal, oil, natural gas, peat, shale wood. As a result of the influence of solar rays on the biosphere during the earth's lengthy development process, large organic fuel reserves were formed in its bowels. The total amount of solar energy falling on the earth is enormous. However, only that part of it is assimilated through photosynthesis which falls on biologically-active surfaces which amounts to about 10 percent of the entire surface of the earth and is spread extremely unevenly.

There are optimistic and pessimistic assessments of the potential organic fuel resources in the bowels of the earth. They differ from one another because of the inadequate reliability of survey data and the difference in approaches to estimating the extractability and feasibility of use.

According to data of the World Power Conference (MIREK-XI, 1980), to supply mankind with explored extracted organic fuel reserves amounts to 1,000 billion tons of standard fuel which guarantees energy production for approximately 100 years. Moreover, oil amounts to 13 percent of the total amount of fuel resources, natural gas and condensate make up 11 percent, and coal about 70 percent.

Our country is the only large industrial state in the world which bases its economic growth on its own power fuel resources. The total coal reserves in the USSR are about one half of the world reserves and oil and gas is exported to many countries of the world. The overwhelming part of these resources is located in the eastern regions of the country while the main consumers of electric power, steam and hot water right up to 1990 will be concentrated, as before, in the European area. Therefore, when developing power engineering based only on organic fuel usage, disproportions in locating, extracting, and consuming fuel will be all the more strongly displayed over time. Moreover, fuel shipments into the European part of the country are growing noticeably and they now already make up a considerable share of the total railroad freight turnover.

The need to constantly provide the national economy with power resources, the scarcity of mineral fuels, and the irregularity of their distribution require searches for new power sources.

The industrial use of such renewable power sources as wave, tidal, geothermal, solar and wind power by the end of this century can provide only a certain part of the requirement for power. It is becoming clear that without drawing in nuclear sources, it is impossible to satisfy the growing power requirements for the next 50-70 years.

Nuclear fuel is a material whose atomic nuclei split when interacting with neutrons releasing a large amount of thermal energy and emitting new neutrons capable of causing a split of the next nuclei (chain reaction).

The isotope uranium-235 is, practically speaking, the only natural material which splits under the influence of neutrons of any energies, releasing the excess neutrons required for carrying out a controlled chain reaction in the reactor. Its content in natural uranium is insignificant--about 0.7 percent, and 99.2 percent consists of the isotope uranium-238 which is slightly involved in energy production in thermal neutron reactors.

Taking into account all of the factors in thermal neutron nuclear reactors, only 2.5 percent of the natural uranium is burned. Can major world power engineering be created with such an ineffective use of natural uranium? The abundance of uranium in nature is significant and it correlates with the distribution of tin, arsenic, molybdenum but less with copper and lead.

Because of the high chemical activity, uranium is not found in nature in a clean (metallic) form but occurs in chemical compounds. In all about 200 uranium-bearing minerals of diverse chemical composition have been identified in the interior of the earth. Uranium is contained in rocks--granites, basalts, and in ocean and sea water.

World nuclear fuel reserves, including potential ones, according to published data, amount to around 2-2.5 million tons. They have been greatly underestimated because of the poor study of many large regions and they are apparently really several times larger.

If you assume that the amount of natural uranium with economically feasible extraction costs is about four million tons and that nuclear power plants with a total capacity of 800 million kilowatts will be in operation in the world by the year 2000, then the stated amount of nuclear fuel will be used up by the year 2030. This, of course, is on the condition that all system power plants will operate with thermal neutron reactors. It becomes evident from this that nuclear fuel, when using it in thermal neutron reactors, is far from unlimited.

The opinion is current among many "non-nuclear" specialists that nuclear power plants are non-fuel power installations. However, as is apparent from the data presented, this is far from so in spite of the high thermal power of nuclear fuel.

The requirement for the fullest utilization of nuclear fuel is possible with the broad use of fast reactors in which natural uranium is used 20-30 times more effectively because of the production of a secondary nuclear fuel--plutonium-239. If you calculate for the sufficiently full consumption of natural uranium and thorium, whose reserves far exceed uranium reserves, then nuclear resources are sufficient for many centuries.

At the June (1983) CPSU Central Committee plenum it was noted that the future of our power engineering is, first of all, the use of the newest nuclear reactors. Without this it is impossible to carry out the task set in the USSR Power Program of spiking the development of nuclear power engineering to produce electric and thermal power and to free up on this basis a significant amount of organic fuel.

The existing experimental industrial fast reactors do not fully answer the requirements necessary for the expanded production of new fuel.

Speeding up the manufacture of plutonium in fast reactors with the aim of using it in the future for reactors newly introduced into operation or for their own needs, requires an increase in thermal stress in the reaction zone, a decrease in the amount of moderator, a lowering of the amount of fuel in the total fuel cycle, a speeding up of radiochemical fuel regeneration, as well as the solution to a number of other complicated problems, but not later than 1995. In the mid-1990's, it will be necessary to begin the introduction of highly-economical "fast" reactors. This is the future but the future is not far off. The very first stage in developing nuclear power engineering is the construction of large nuclear power plants with thermal neutron reactors to produce electric power and low-level industrial and domestic heat as well as the storage of plutonium for the primary fuel loading of fast reactors.

What advantages and shortcomings do nuclear power plants have over power plants operating on organic fuels?

One of the advantages is that the places for locating nuclear power engineering projects are not connected with uranium ore extraction and nuclear fuel production sites.

The economical nature of nuclear power plants should be studied not by comparing individual AES's [nuclear electric power plants] and TES's [thermal electric power plants] but on an intersectorial basis, i.e., by jointly examining the savings directly through AES's and nuclear fuel on the one hand and TES's with their fuel supply system on the other hand.

Nuclear fuel has extraordinarily high heat value. When substituting it for organic fuel, the national economy obtains a fundamental economic effect because of a decrease in costs for extraction and especially transportation.

The proportionate capital investments for the construction of an AES, as a rule, are roughly twice as high as these indicators for TES's. However, when estimating capital investments in nuclear power engineering, the necessary investments in the heat supply industry must be taken into account. For TES's this includes organic fuel extraction, treatment and transportation enterprises (including the construction of transportation facilities, storage, preparation for burning, ash and slag disposal, etc.), while for AES's it is the corresponding fuel cycle enterprises for the treatment, storage, and the removal of radioactive wastes and their burial. A comparison of the quoted expenditures shows an advantage for the AES.

The production cost of electric power generated at nuclear power plants in all countries is lower than the production cost of electric power obtained at TES's.

When speaking about power engineering, especially on a large scale, it is impossible not to take into account the influence of power projects on the environment. An advantage of the wide introduction of nuclear power over TES's is the significant decrease in environmental pollution. At the present time throughout the world, power installations requiring enormous quantities of oxygen are emitting huge amounts of sulfur dioxide and carbon dioxide compounds into the atmosphere yearly. These emissions may exceed permissible norms by the year 2000.

Nuclear power plants do not expend oxygen, do not clog the atmosphere with carbon dioxide, ash, sulfur, and other harmful impurities, i.e., they help the ecological balance.

The USSR, as is generally known, is the homeland for the peaceful use of atomic energy. After the construction of the first nuclear power plant in the world at Obninsk in 1954, the stage began for the building of experimental industrial power blocks with a switch to the construction of AES's with standard large-capacity power installations.

In "Basic Directions for the Economic and Social Development of the USSR in the Years 1981-1985 and for the Period up to 1990," provisions have been made to ensure the growth of electric power production in the European part of the USSR mainly at nuclear and hydroelectric plants, to bring electric power generation at nuclear power plants up to 220-225 billion kilowatt hours in 1985. The plan calls for the introduction of 24-25 million kilowatts of new capacities at nuclear power plants. Work will also continue on developing fast reactors and using nuclear fuel to generate thermal power.

The development of Soviet nuclear power engineering is based on two types of reactors--water-cooled (VVER) and water-graphite (RBMK). Besides the technical features, these units make different demands on a machine building facility.

Water-cooled reactors need the construction of a specialized machine building facility to manufacture powerful reactor vessels but water-graphite reactor equipment can be manufactured at existing plants.

Some 28 power blocks with VVER reactors are being successfully operated in our country as well as in CEMA member countries and Finland. Capacities have been introduced at AES's in the 10th Five-Year Plan mainly through power blocks with RBMK-1000 water-graphite reactors. Power blocks with RBMK-1000 reactors with a total capacity of 12 million kilowatts are in operation at the Leningradskaya, Kurskaya, Chernobylskaya, and Smolenskaya AES's.

The largest power block in the world with an RBMK reactor was commissioned at the Ignalinskaya AES at the end of 1983. Its capacity is 1.5 million kilowatts.

To put the planned capacity of the Volgodonsk Atomic Machine Building Plant--Atommash into operation, power blocks with VVER-1000 reactors are becoming the basis for the electric-generating capacities introduced at AES's in the Soviet Union. Designers and planners associate the improvement of technical and economic indicators of power blocks with water-cooled reactors primarily with the growth of their unit power. Planning work is now being conducted on building AES's with 1.5 million kilowatt VVER reactors per power block.

Along with the use of water-cooled reactors, power blocks with channel water-graphite reactors, aimed at improving AES technical and economic indicators and their operational reliability, will be improved.

Many years of experience in operating AES's built in the USSR or abroad, with its technical assistance, have demonstrated reliability, economy, and operational safety. A system of measures including progressive planning decisions, the manufacture and installation of high-quality equipment, and the high level of operational personnel training have ensured this.

A special organ--Gosatomenergonadzor[state nuclear power inspectorate], controlling work aspects connected with safety at all stages of AES construction, beginning with the choice of construction sites, was set up in the Soviet Union in 1983 to strengthen control over AES operations.

The achievement of these measures has permitted an orientation in national economic plans toward the broad introduction of AES's into the country's electric power engineering. The plan in the USSR in the current five-year plan is to introduce new capacities at the Kolskaya, Smolenskaya, Kalininskaya, Kurskaya, Balakovskaya, Rostovskaya, Khmelnitskaya, Zaporozhskaya, Yuzhno-Ukrainskaya, Rovenskaya, and Ignalinskaya AES's.

The AES's in operation and under construction in the USSR are intended for working in the basic part of the power system load schedule, i.e., during the time of using an installed power per year of 6500-7000 hours when AES's have smaller calculated costs for electric power production than organic-fuel condensation power plants. The operating schedule of each power plant in power systems is also determined by a configuration of the daily, weekly and yearly electric consumption schedule, the make-up of the generating capacities, and the maneuverability potential for all types of electric power plants.

A change in electrical consumption conditions in the Unified Power System is associated mainly with an increase in evening shift loads in industry, a decrease in night loads, and also an increase in municipal and agricultural activity loads. The factors enumerated lead in the long-term to some further breakdown of the daily, weekly and yearly load schedules. The ideas stated inevitably raise the question of using nuclear fuel to cover the variable part of the power plant load schedule in the European part of the country. The AES's in operation and under construction can be adapted to a seasonal and weekly power system load regulation schedule. The advisability of this must be determined by technical and economic studies, to include the make-up of the generating equipment in the power system and fuel closing costs. However, as an analysis of the operational experience of active power blocks and an analysis of their main design solutions have shown, a number of factors exist which limit their part in daily regulation: the transient contamination of the reactor during power drops, insufficient study of fuel element stability under varying loads, and high cyclical thermal stresses in equipment and materials.

Building power blocks with reactor units which change their thermal capacity in the daily regulation mode is a rather complicated problem whose solution requires an increase in the proportionate capital investments for constructing such power blocks and, additionally, will be accompanied by an increase in the fuel constituent of costs for generating electric power. For the conditions of our country, the use of nuclear fuel to cover the varying part of the AES daily load schedule seems to be economically inefficient in comparison with organic fuel thermal power plants. Weekly regulation (Saturday, Sunday) is already being done now.

A more long-term trend is the construction of power complexes: an AES plus a GAES[pumped-storage electric power plant]. Such power complexes are being constructed as part of the 4000-megawatt Yuzhno-Ukrainskaya AES, the Tashlykskaya GES[hydroelectric power plant] (1050 megawatts), and the Konstantinovskaya GES (370 megawatts). The electric power generated by the maneuverable part of this power complex is less expensive than the electric power generated by TES's[thermal electric power stations], even at today's organic fuel costs. Therefore, as power sources which are used up to 4-5 hours a day and 500-1000 hours a year, the plan is to construct in the USSR pumped-storage electric power plants with a capacity of 1000-2000 megawatts and, under favorable terrain conditions--up to 4000 megawatts.

The conversion from mechanical power accumulation to thermal at an AES by the inclusion of APV's [feed water accumulators] in the thermal system requires a much smaller number of accumulators. Planning work-ups of such AES's are now being done. Apparently the immediate thing will be the construction of an AES with APV's with the presence at it of turbines with heating take-offs because in this case there is the possibility of using existing turbo-generators in a maneuverable mode without significantly modernizing them.

The basic directions of the economic and social development of the USSR for the 11th Five-Year Plan and for the period up to 1990 provide for continuing work on using nuclear fuel to generate thermal power and also finishing the manufacture and delivery of the first nuclear reactors for the heat supply of major cities. The attention which has been paid to the heat supply problem is not accidental. Of the total USSR heat consumption volume, up to 40 percent of the fuel resources are expended by TETS's and boiler houses to supply heat to industrial and domestic consumers. This is greater than the amount of fuel required by electric power plants. A higher-quality organic fuel than that at electric power plants must be used for heating needs both because of ecological considerations and the unadaptability of boiler houses for burning low-grade fuel.

The use of nuclear power for the heat supply of cities and industrial centers can be realized by using unregulated steam bleeding at AKES [nuclear condensation electric power plants], constructing mixed heating and condensation nuclear electric power plants with TK-450 - 500/60 turbines, AST's [nuclear heat supply plants] generating only thermal power, and specialized ATETs [nuclear heat and electric power plants] located in immediate proximity to industrial and housing complexes.

The first of the trends identified (using unregulated steam bleeding for heat supply needs at AKES's) was accomplished for the first time in the world in the USSR with the introduction at the Beloyarskaya AES of district heating plants with a total capacity of 21 gigacalories per hour. Many years of operational experience with these plants have already been accumulated which have confirmed the possibility of a reliable, economic and safe heat supply from AES's and have permitted a determination of the direction for further improving district heating plants attached to AES's.

Heat supplied by an AKES is now fed to customers located in immediate proximity to it. It is used for heating and for supplying hot water to production installations of the industrial site, construction base for the special treatment needs of the water supplied to the station's housing settlement, etc. Planning work-ups are simultaneously being conducted of connections of the Kursk heat supply system to the Kurskaya AES and of Volgodonsk to the Rostovskaya AES.

If regular AKES's are mainly oriented toward the production of electric power, then the condensation and heating plants (ATETs with TK turbines), besides producing electric power, are still also intended to satisfy the significantly great consumer heat loads. The use at such ATETs's of TK turbines permits an increase in the release of heat from one 1000-megawatt (elec.) power block of up to 1000 gigacalories per hour. The plan is to build the first such ATETs

for the Odessa heat supply. The high economic effectiveness of producing heat in such a way also predetermines the necessity for the broad introduction of both regulated and unregulated steam bleeding from AES's for the heat supply.

The reactors used both at condensation and at condensation and heat AES's restrict their placement relative to industrial and housing complexes which are large heat consumers. Therefore, the Odesskaya ATETs is located 25 kilometers from the city which requires a considerable outlay of pipe for the direct shipment of heat from the ATETs to the peak boiler houses.

The construction of condensation and heat nuclear power plants can be limited in some cases by such factors, for example, as a shortage of service water required in great amounts to cool a turbine capacitor with a large "attached" condensation power, the lack of a demand for introducing electrical generating capacities, etc. Taking this into account, a plan was developed in the USSR for a single-purpose AST. A low-level water-cooled reactor with a 500-megawatt unit capacity has been especially designed for AST's. The technical resolutions made when constructing an AST permit bringing the nuclear heat source closer to the heat consumption area, 2-3 kilometers from the city building limits. Experimental industrial AST's of this type are now being built in Gorkiy and Voronezh.

The quoted heat production costs at AST's do not exceed the level of production by large regional organic-fuel boiler houses. A two-block AST provides the yearly displacement with nuclear fuel of up to 950,000 tons of organic fuel used for supplying heat.

The planned broad introduction of nuclear heat and electric consumption sources, the further growth in the economic competitiveness of nuclear power engineering in comparison with electric power engineering which requires all the greater expenditures for environmental protection and, primarily, for the air basin, lead inevitably to the necessity for enlarging the nuclear power engineering fuel base. Therefore, great attention is being paid in the Soviet Union to the development of fast reactors. They will produce nuclear fuel in an amount greater than required. The intention is to continue work on developing fast reactors with a capacity of 800,000-1,600,000 kilowatts. Now in operation in the USSR are an experimental industrial AES with a BN-350 reactor, with a 150-megawatt electrical capacity, which distills sea water for the needs of the city of Shevchenko and an experimental industrial AES with a BN-600 reactor, with a 600-megawatt electrical capacity (Beloyarskaya AES).

These reactor designs make it possible to check under industrial conditions the engineering solutions and economy of fast reactor AES's. The construction of a power block with a BN-800 reactor which in its heat mechanical equipment and main design resolutions will be a prototype of power blocks with BN-1600 reactors and the creation of the necessary external fuel cycle enterprises is the next stage in the long-term construction of a nuclear power engineering fuel base not dependent on a rise in the cost of natural uranium.

In September 1984, the CPSU Central Committee Politburo examined the question of additional measures to ensure the accelerated development of nuclear power engineering for the period up to 1990. In the CPSU Central Committee and USSR Council of Minister's decree adopted on this question, the task was set to provide for the rapid development of nuclear power engineering aimed at the further growth of electric power production and an improvement in the make-up of the power fuel balance in accordance with the USSR Power Program.

The decree has established the sizing and deadlines for introducing the new capacities of the power engineering enterprises and the machine building, manufacturing, and technological equipment delivery sectors connected with them.

USSR Gosplan[State Planning Committee], USSR Gossnab[State Committee for Material and Technical Supply], Minenergo[Ministry of Power and Electrification], and other ministries and departments must adopt urgent measures to improve the material and technical supply of nuclear power engineering projects, provide a high technical level for the design and construction quality of nuclear plants, improve their operation, increase the reliability and operational safety of the installed equipment, and train highly-skilled power worker and power builder personnel.

The CPSU Central Committee Politburo has especially stressed that the successful development of nuclear power engineering is one of the fundamental questions in further increasing the effectiveness of the national economy.

9524
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NUCLEAR POWER

FUTURE DEVELOPMENT OF CZECH NUCLEAR POWER INDUSTRY OUTLINED

Moscow EKONOMICHESKOYE SOTRUDNICHESTVO STRAN-CHLENOV SEV in Russian No 3, Mar 84 pp 6-10

[Article by Stanislav Gavel, chairman of the Czechoslovakian Atomic Energy Commission: "On the Chief Direction for the Development of the Nuclear Power Industry"]

[Text] At the present time, the CEMA member nations, with the exception of the Soviet Union, are not able to cover the requirements of their primary power consumers by means of their own mining production, particularly because of the shortage of fossil fuel reserves. It is only due to the huge reserves of coal, oil and natural gas in the Soviet Union and the tremendous effort directed by the USSR toward their mining and transport that the CEMA member nations do not depend upon the import of primary power sources from nonsocialist states. In 1980, the CSSR satisfied only about 64 percent of its needs using its own reserves of fuel and energy. Czechoslovakia imports more than a third of its sources of energy, primarily oil and natural gas, from the Soviet Union. In addition, the CSSR imports coal and obtains electric power both from the USSR and the other CEMA member nations.

The European sector of the Soviet Union also does not have sufficient reserves of the classic raw materials for power generation; the richest deposits of oil, coal and natural gas are located in Siberia. The transport of oil and natural gas by pipeline from the USSR makes it possible for the other CEMA member nations to cover their technically and economically justified needs, although it will be necessary to seek new sources of such raw materials for the further increase in the demand for fuel and power in these countries. The only real and decisive source before the end of the 20th century and in the first decades of the 21st will be nuclear power based on the fission of uranium and plutonium nuclei .

Nuclear Power: The Advantages

The development of nuclear power possesses the following advantages.

The CEMA member nations have at their disposal considerable reserves of natural uranium, the mining of which can insure the operation of nuclear power stations with thermal reactors whose construction has been planned approximately by the end of the 20th century. The construction of nuclear power stations with fast-neutron reactors can satisfy the power needs of these countries for several centuries.

The technology for producing the equipment and the construction of nuclear power plants with first-generation thermal reactors have been fully mastered, and the safe and reliable operation of these power stations has likewise been insured.

In all the CEMA member nations, the expenditures for the production of electric power at nuclear power plants are lower than at electric power stations which burn fossil fuel.

Nuclear power plants exert considerably less of a negative influence on the environment than thermal stations, even from the point of view of the emission of radioactive substances.

The probability of a serious nuclear power plant accident associated with the dangerous leak of radioactive substances has been reduced theough the use of modern technological means to a value of 10^{-7}, which is four orders less than the probability of great natural catastrophes.

Productive Cooperation

The CEMA member nations have developed a joint program for the construction of nuclear power plants with VVER-440 and VVER-1000 units before 1990. Prototypes of these reactors underwent testing in the USSR at the Novovoronezh nuclear power plant. The program was based on the General Agreement on Cooperation in the Long-Range Development of Integrated Power Systems of the CEMA Member Nations for the Period to 1990 and on the Agreement on Multilateral International Specialization and Cooperation in the Production and Mutual Delivery of Equipment for Nuclear Power Plants in 1981-1990.

A decisive role in their realization belongs to the USSR, which is the general contractor for all nuclear power plants with VVER-type reactors built in the CEMA member nations as well as the chief designer of these reactors and of all the basic equipment in the primary circuits of nuclear power plants.

The Soviet Union produces the nuclear-pure uranium for all the CEMA member nations, provides for its isotope enrichment and the production of fuel rods and deliver nuclear fuel to the CEMA member nations in the form of assembled fuel cassettes with guaranteed parameters. It also receives the spent fuel from the VVER-type reactors of the CEMA member nations for regeneration after its long-term storage on the premises of the power stations.

The Role of the Commission

The Permanent CEMA Commission for Cooperation in the Area of the Utilization of Nuclear Power for Peaceful Goals plays an important role in the development of the nuclear power industry. It organizes and coordinates all the most important scientific research and experimental design work, the goals of which are:

to improve the technical and economic parameters of nuclear power plants with VVER-440 reactors;

to provide for the development of equipment for nuclear power plants with VVER-1000 reactors and to insure the mastery of its production;

to provide for the development and introduction into production of equipment for nuclear power stations with high-output fast-neutron reactors cooled by liquid sodium;

to supply industry and the public-utilities sphere as well as agriculture with heat in the form of hot water obtained at nuclear installations;

to solve the problem of the introduction of a complete closed nuclear-fuel cycle primarily through the reprocessing of spent nuclear fuel with the recovery of uranium and plutonium for the subsequent fuel cycle as well as the neutralization and storage of radioactive wastes with high levels of radioactivity;

in the field of fundamental research, to study problems related to the nuclear fusion of deuterium and tritium in TOKAMAK-type units.

The Nuclear Power Complex

The CSSR is extremely interested in a joint solution to questions involved in the creation of an integrated nuclear power complex of CEMA member nations, since the last coal-fired electric power plant was commissioned in the CSSR in 1982, and all future growth in the output of the electric power system to the end of the century and a considerable portion of the demand for heat must be covered by the development of the nuclear power industry. The situation will be even more complicated in the year 2000, when the mining of natural deposits of lignite and powerplant-grade coal will decrease as a result of their gradual exhaustion, and the nuclear power industry will not only have to provide for the necessary increase in the output of the electric power system but will also have to compensate for the reduced outputs of coal-fired electric power plants.

The Czechoslovakian scientific research, planning-and-design and production base is taking part in the development of an integrated nuclear power complex for the CEMA member nations in those regions where we have the corresponding raw materials and the material and technical prerequisites. In particular, this includes the geological surveying and mining of uranium ores and their processing into concentrate; the construction of nuclear power plants on the territory of the CSSR, the development and production of materials and the delivery of equipment for nuclear power plants built in Czechoslovakia as well as in the other CEMA member nations within a framework of specialization; and participation in the execution of a joint scientific research program in the area of nuclear power engineering.

In addition, we have organized a system of state control over technical, radiation and nuclear safety during the manufacture and installation of nuclear units, the start-up and operation of nuclear power plants and the transportation of nuclear materials. This latter aspect includes the accounting for and compiling of data on the movements of nuclear materials for domestic and international monitoring (the CSSR has entered into an international treaty on the nonprolif-

eration of nuclear weapons and has adopted the system of international monitoring practiced by the International Atomic Energy Agency in Vienna).

Czechoslovakia is carrying out the extensive training of qualified personnel in the areas of research, production and the operation of nuclear power units. No less important a place is assigned to work on protecting the environment with the development of the nuclear power industry and the use of ionizing radiation.

The Construction of Nuclear Power Plants

Two power units with a combined output of 880 MW are in operation in Czechoslovakia at the Bogunitse nuclear power plant, while 10 more with VVER-440 reactors are in the construction stage--of these, two are at the Bogunitse AES and four apiece are at the Dukovany and Mokhovtse nuclear power plants. Construction preparations are underway on four units with VVER-1000 reactors at the Temelin AES. Thus, units with a total output of 880 MW have already been placed into service, units with an output of 4,400 MW are in the construction stage and units with an output of 4,000 MW are in preparation. A total of 5,280 MW should be placed into operation by 1990 which will increase the percentage share of nuclear power plants in the total installed capacity of the Czechoslovakian power system to 25 percent.

Since the natural conditions in the CSSR are favorable, pumped-storage hydroelectric power stations (GAES's) are being built along with nuclear power stations. Units with individual power outputs of up to 300 MW are being manufactured for these stations. GAES's are designed to cover peak loads, insuring the steady functioning of AES's during the course of the day and during the week and thus providing a high degree of annual utilization of the installed capacity. Since the selection of AES construction sites should be done with particular care, primarily from the point of view of nuclear safety and seismic activity, a search is already underway in the CSSR for sites for the construction of nuclear power plants in 1990-2000. In addition, it is necessary to consider both the even distribution of capacities within the power system and the demand for heat in major industrial and population centers.

Nuclear Power Equipment Construction

In the area of nuclear power equipment construction, the CSSR has set up the production of the entire gamut of equipment for AES's with VVER-440 reactors within a framework of specialization. This consists primarily of the following equipment:

reactor assemblies, that is, reactor vessels and covers, the units within the reactor itself and the auxiliary equipment for the installation and dismantling of reactors, the supplier of which is the Skoda company in Plzen;

steam generators and expansion tanks manufactured by the Vitkovitse company in Ostrava. At the same time, this company is the supplier of semifinished metal billets for the manufacture of reactor vessels, the primary pipelines and the main cutoff valves.

All the pipelines and fittings, including the main coolant circuit of 500-mm diameter, are manufactured by the Sigma company in Olomouc. This company produces auxiliary pumps (primarily feed pumps) for the first circuit.

The tanks and apparatus for the secondary circuits of the primary section, manufactured mainly from high-quality austenitic steels, are supplied by the Hepos company in Brno. It also produces rust-proof devices for the bubbler towers in the emergency protection systems of nuclear power plants.

The equipment assemblies in the secondary portion of the AES, that is, primarily turbine units, steam separators and heaters, condensers, regenerating units and condenser modules, are supplied by the Skoda company in Plzen.

Other materials and equipment making up the rest of the AES are supplied by industrial-economic enterprises of the ferrous metal industry in Prague, high-voltage electrical equipment plants, plants that manufacture air-circulation equipment, plants that produce automated devices and computers as well as a number of other plants.

As can be seen, the majority of the country's major metallurgical, machine-building and electrotechnical plants are connected with the production of equipment for the nuclear power industry in the CSSR. One can say that the beginning of the manufacture of equipment for nuclear power plants signifies one of the most important changes in Czechoslovakian industry associated with the high demands placed on the technical level of production as well as with the necessity for considerably improving the quality and productivity of labor.

The CSSR obtains individual types of equipment from the other CEMA member nations based on the specialization of production. Such equipment, for example, is the main coolant pumps, measurement instruments, control instruments and computer technology from the USSR, highly automated overhead traveling cranes from East Germany for the servicing of reactors, diesel-powered electric generators from Poland, etc.

An important role in developing an industrial base for nuclear power equipment construction and in carrying out the mutual delivery of equipment for AES's is played by the Interatomenergo International Economic Association located in Moscow, in which organizations from all the European member nations of CEMA and Yugoslavia are represented. The Skoda concern in Plzen is the Czechoslovakian representative. Confronting the Interatomenergo International Economic Association are important tasks in the areas of standardization, international cooperation in providing for the major overhaul and scheduled maintenance of AES equipment and the production of spare parts and their warehousing.

Scientific-Technical Cooperation

The CSSR is taking part in a joint program of scientific and technical research in nuclear engineering in the following basic directions.

1. In the area of improving the technical and economic parameters of nuclear power stations with VVER-440 reactors, we are first of all investigating the problem of improving the reliability of the equipment for the best annual uti-

Nuclear power plants in the CSSR

Key:
1 - Operating
2 - Under construction

lization of installed capacity. Also of great significance are the joint studies of a temporary international collective of physicists on the reactor core in an effort to find a more equal distribution of stresses and increase the degree to which the nuclear fuel is burned. These studies will also be served by the rebuilt experimental zero-output LR-0 reactor at the Institute of Nuclear Research in Rzez, near Prague.

2. Particular attention in the current five-year plan will be devoted to the development and mastery of the production of equipment for nuclear power stations with VVER-1000 reactors. Czechoslovakian production-economic associations are interested basically in the manufacture of the same types of equipment for these stations as for AES's with VVER-440 reactors. Since the VVER-1000 reactor not only has a high unit output but also operates at higher pressures and temperatures and, consequently, with a higher degree of efficiency in converting heat into electric power, the primary attention in the area of research and development is today being devoted to the mastery of the production of new, higher quality construction materials and the preparation of the technology for manufacturing all the equipment under the guidance of and in cooperation with the chief designer--the USSR State Committee for the Utilization of Nuclear Energy. All these studies are organized in such a way that Czechoslovakian industry will insure the delivery of the equipment for AES's under construction both in the CSSR and in the CEMA member nations by the specified deadlines.

The development of fast-neutron reactors is being carried out today at the 800-MW level with the promise of unit outputs of up to 1,600 MW, and is intended to

be long-term in nature. Nevertheless, this development is very critical. Considering the reserves of natural resources and the conditions for the mining of uranium, AES's with fast-neutron reactors will have to be connected to the Integrated Power Systems of the CEMA member nations as early as the end of this century. It is these reactors, without a doubt, that will become the core of the nuclear industry's development at the beginning of the next century. The Czechoslovakian scientific research and experimental design base is oriented first of all toward the creation of fittings for liquid-sodium cooling circuits (the Sigma company) and toward progressive types of so-called modular steam generators, the design of which is being successfully carried out by the Power Equipment Research Institute in Brno and the Brno Metallurgical Plant No. 1, both of which are part of the Skoda association. The Institute of Nuclear Research in Rzez near Prague is the primary coordinator of the task. In a number of calculated and experimental studies, it cooperates with the chief executors of the task--those organizations which lie within the jursidiction of the USSR State Committee for the Utilization of Nuclear Energy.

3. The reprocessing of irradiated fuel both from thermal reactors and from fast-neutron reactors is a key issue in insuring reliable sources of nuclear fuel for fast-neutron reactors. Likewise inseparably tied to this are the neutralization and safe storage of radioactive wastes. According to agreement with the other CEMA member nations, the Soviet Union has taken upon itself the construction of plants for the reprocessing of spent nuclear fuel from thermal water-cooled water-modulated reactors. The problems involved in the hydrometallurgical technology for the reprocessing of spent fuel that has undergone a containment process in long-term storage areas have basically been solved. The so-called fluoride method has been proposed as an alternate solution to the regeneration of spent fuel from fast-neutron reactors. At the present time, specialists are studying the technology and developing the equipment for the application of such a method. This would make it possible to reprocess spent fuel with a high degree of radioactivity that had been stored for only a few months after it had been unloaded from the reactor. This would also accelerate the return of highly valuable plutonium to the production of fuel and would improve the efficiency of the fuel cycle. The CSSR is cooperating with the USSR in this area and with the other CEMA member nations, participating in the development and delivery of individual types of equipment for semi-industrial installations in the USSR. Individual problems with the neutralization of radioactive wastes with a low degree of radioactivity have been solved by the Institute of Nuclear Research in Rzez in cooperation with the Institute of Chemical Equipment in Brno. Progressive technology has been developed and an experimental installation for the neutralization of these wastes through bituminization has been created. Further research work in the CSSR has been directed toward the encapsulation of nuclear wastes in glass.

4. In the area of fundamental research, the efforts of the CEMA member nations have been directed toward obtaining energy by means of the thermonuclear fusion of deuterium and tritium in TOKAMAK-type installations. Taking part in these studies from the Czechoslovakian side is first of all the Institute of Plasma Physics of the Czechoslovakian Academy of Sciences in Prague which is the coordinator of those tasks being solved by the Czechoslovakian research base and

Billet for roof flange of VVER-1000 reactor

which is working in conjunction with the chief coordinator of the work being done on this problem--the Institute of Atomic Energy imeni Kurchatov in Moscow. The institutes of the Czechoslovakian and Soviet Academies of Science are solving several problems at the request of the chief coordinator, in particular, such as the additional heating of the plasma, the development of the instrument-building technology for diagnostic purposes and several questions involving superconducting materials.

Ionizing Radiation

The Permanent Commission for Cooperation in the Area of the Utilization of Nuclear Power for Peaceful Goals is also occupied with questions regarding the sources and application of ionizing radiation--one of the most progressive spheres of the new technology being utilized in scientific research and in industry. The commission first of all on one hand coordinates joint work in the development of sources of ionizing radiation and the charged-particle accelerators, and of radionuclides and the compounds traced by them on the other. A comprehensive program of production specialization in this area among the CEMA member nations has been agreed to. The CSSR manufactures the betatrons that are a source of beta- and gamma-ray radiation both for medical purposes and for flaw-detectors, primarily in heavy machine building. Radiation units that employ radioisotopes of cobalt and cesium are being manufactured in the CSSR exclusively for medical purposes. In cooperation with the Soviet Union, a progressive type of x-ray stimulator which locates malignant tumors with a high degree of accuracy and makes it possible to irradiate the damaged area with a minimum of radiation danger to healthy tissue.

High-speed sector valve for AES's with fast-neutron reactors. Developed by the Sigma Scientific Research Institute [CSSR] and the Physical Energy Insititute in Obninsk [USSR]

In accordance with agreements on specialization, scientific-industrial and research organizations of the Czechoslovakian Atomic Energy Commission are producing a number of tracer compounds which are being supplied for biological and medical research in the CEMA member nations. For its own needs, the CSSR

produces radiopharmaceutical preparations and kits for radioimmunoanalysis which play a greater and greater role in modern medicine and veterinary science.

Nuclear instrument building is likewise an integral part of the utilization of ionizing radiation. Cooperation here proceeds on the basis of international agreements among the CEMA member nations with regard to specialization and is coordinated by the Interatominstrument International Economic Association. This association, located in Warsaw, has its own production base and has branches and shops for the repair of nuclear instruments in some CEMA member nations. In our country, nuclear instrument construction is concentrated at the Tesla company in Brno. A plant at the Institute of Radioecology and the Utilization of Nuclear Technology in Kosice is being built for the production of unique instruments.

In the Scientific Research Institute of the Textile Industry in Veverska Bytyshke near Brno, a powerful base has been created which works with a radioisotope of cobalt.

Thus, the nuclear power complex and the application of ionizing radiation--in other words, the utilization of nuclear power for peaceful goals--encompasses a broad area of science, technology and industry and possesses great significance for the economy. This entire complex can be successfully developed only under conditions of large-scale economic integration within the framework of the CEMA. It is precisely due to this cooperation between the CSSR and the other CEMA member nations that the Czechoslovakian economy is able to use this most progressive technology to an ever growing degree in the 20th century in the construction of a developed socialist society.

9512
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NUCLEAR POWER

DEVELOPMENT OF NUCLEAR HEAT SUPPLY IN CEMA MEMBER NATIONS DISCUSSED

Moscow EKONOMICHESKOYE SOTRUDNICHESTVO STRAN-CHLENOV SEV in Russian No 3, Mar 84 pp 42-46

[Article by A. Panasenkov, department chief of the CEMA Secretariat, and V. G. Sychev and K. Menzel, members of the CEMA Secretariat: "Nuclear Heat Supply--A Promising Direction for Cooperation"

[Text] Nuclear power has found extensive application in the electric power industry of the CEMA member nations. In 1983, the installed capacity of AES's in the countries of socialist cooperation reached 25,000 MW. This makes it possible to conserve about 50 million tons of standard fuel. If one considers that approximately 20 to 25 percent of energy resources are expended on the production of electric power, then it is obvious that the possibility for conserving scarce fossil fuel is limited here to a certain degree and even in the distant future will not exceed 10 percent.

Within power engineering there is another area that is even more far-reaching with respect to the consumption of energy resources--heat and power engineering, where up to 40 percent of the fossil fuel is used. Here there also are extensive possibilities for the utilization of nuclear power.

For a number of years already, the CEMA member nations have shown considerable interest in a new direction in nuclear power engineering--nuclear heat supply. An analysis of the long-term fuel-power balance carried out in a number of countries has shown quite clearly the necessity for utilizing nuclear fuel to cover the demand for municipal utility and industrial heat.

At its 106th session (June 1983), the CEMA Executive Committee adopted a resolution on the organization of multilateral cooperation among the CEMA member nations in the area of nuclear heat supply. In accordance with this resolution, the Permanent CEMA Commissions for Cooperation in the Area of the Utilization of Nuclear Power for Peaceful Goals, the Intergovernmental Commission for Cooperation in the Production of Equipment for AES's and the Interatomenergo International Economic Association must present to the CEMA Executive Committee in 1985 a draft of an agreement for the cooperation of the CEMA member nations in scientific-technical and design studies in the area of nuclear central heating and power plants (ATETS's) and nuclear heat-supply plants (AST's) for the generation of industrial steam and for heat-supply needs in the period from 1986 to 2000.

In carrying out this resolution of the commission, at the next sessions (October and November 1983) the members adopted the order and timetable for preparing an agreement and a program of cooperation in the area of nuclear heat supply.

It must also be noted that the Executive Committee simultaneously adopted a resolution on the development of a program of construction of AES's and nuclear sources of heat supply to the year 2000 based on the potential for providing them with nuclear fuel and the necessary equipment.

Thus, we are on the threshold of the organization of multilateral cooperation in the area of nuclear heat supply from the scientific-technical studies to a program of construction. In connection with this, it is considered to be expedient to try to conduct a survey of the present state of the problem, that is, to evaluate the initial positions. The task is made easier to a certian degree since a seminar of specialists from the CEMA member nations was conducted in October 1983 on the theme of "Research and Developments in the Area of Nuclear Heat Supply."

The range of consumers of low-potential heat is extremely broad: municipal utility heat supply, the utilization of steam with various parameters in industry, including the construction industry, the production of cellulose and paper and agricultural fertilizers, an increase in the yield of oil wells, etc. At the present time, studies in the area of nuclear sources of heat are basically directed at providing heat and hot water to dwelling and industrial buildings.

For the near future AES's with a limited release of heat to consumers, ATETS's and single-purpose AST's are being examined as possible types of nuclear heat-supply sources. Studies of single-purpose nuclear plants for industrial heat supply (ASPT's) are also being conducted. All these sources of heat have their advantages, and it seems likely that the optimum combination of these sources will be made for each country in the future.

Due to economic considerations (relatively high capital expenditures and the low fuel component in the cost of the heat), nuclear heat-supply sources (AIT's) are intended to provide the base portion of the heat load. In this case, the peak loads are covered by sources that utilize fossil fuels. The utilization of AIT's is dictated by the necessity to develop large-scale centralized heat-supply systems. The AIT's being examined here are planned for the regulation of the heat supply on a broad scale.

As far is world-wide practice is concerned, studies in the area of nuclear heat supply have made the greatest advances in the Soviet Union. It is advisable, therefore, to dwell first upon the studies that have been carried out in the USSR.

About 55 percent of the demand for heat in the USSR is covered by large-scale centralized heat-supply installations (about two-thirds of which are located in cities). The remaining portion is satisfied by numerous small low-efficiency boiler plants (they number more than 250,000 in the country). The presence of a large number of small-scale installations brings about a consider-

able overexpenditure of fuel and a nonproductive work load for the industry that makes the expensive low-efficiency boilers that require a great deal of metal in their manufacture. For this reason, a major direction in the improvement of the country's thermal industry is the broadly based and systematic centralization of heat supply using TETS's with large-scale boiler and, in the future, nuclear sources of heat supply.

The utilization of unregulated bleed steam at AES's for these needs was accomplished for the first time in the world in the USSR with the commissioning of the 21-GCal/h district-heating units at the Beloyarsk AES. The many years of experience acquired in the use of these units have confirmed the feasibility of reliable, economical and safe heat supply from AES's. At the present time, the drawing-off of heat is being carried out at the Beloyarsk, Chernobylsk, Kursk, Novovoronezh, Kola and other AES's in the country. The additional load is from 30 to 200 GCal/h. The heat is released to consumers located in the immediate vicinity of the AES: heat and hot-water supply for industrial sites, construction bases and the settlement at the station, coverage of special water-purification needs, etc. For the most part, the heat is supplied along with hot water, and the release of steam is carried out in small amounts.

The thermal circuit and the design of the condensing turbines used in AES's at present allow for the release of steam from unregulated bleeds: the K-220-44 turbine (for VVER-440 reactors) with an output of 25 GCal/h, the K-1000-60/1500 turbine (for VVER-1000 reactors) with an output of 200 GCal/h. The calculated output of the bleed steam can be increased even more by setting up additional heating stages. Studies are underway regarding the utilization of condensing turbines with the extraction of high-output bleed steam for district-heating purposes (on the order of 500 GCal/h and higher for AES's with VVER-1000 reactors now under construction, for example, as well as for the second stage of the Rostov AES). This presents great potentials for the utilization of condensing AES's for supplying heat for large-scale regional heat consumption.

If AES's are oriented chiefly toward the production of electric power, then in addition to the production of electric power, condensing district heating stations (ATETS's with type-TK turbines) will also be designed to satisfy thermal loads that are considerably large in scale. The use of type-TK turbines at such AES's makes it possible to increase the output of heat from one power unit of 1,000-MW capacity to 900 GCal/h.

The first such ATETS is being built in the Soviet Union for district heating in the city of Odessa. Its electric output is 2,000 MW. Two power units are being installed at the ATETS, each of which contains a VVER-1000 reactor and two TK-450-500/60 turbines. The city's total heat load covered by the ATETS together with peak-operating fossil fuel-burning boiler plants running in the calculated maximum (winter) mode will amount to approximately 3,000 GCal/h.

The commissioning of the Odessa ATETS will insure a yearly saving of fossil fuel amounting to 4 million tons of standard fuel. Several hundred small-scale boiler plants will be shut down with all the following favorable consequences of an ecological nature occurring as a result. Plans have been made to construct an ATETS of this type in the future for supplying heat to the cities of Kharkov, Minsk, Volgograd and others. It is important to note that the elec-

tric output of a power unit with the release of 900 GCal/h of steam will amount to approximately 900 MW (electric), that is, only 100 MW (electric) less than in the purely condensing mode. The generation of steam by such a method (district heating) is very economical.

VVER-1000 reactors are used at both ATET's and nuclear power stations. For this reason, limitations associated with insuring safety are maintained on the locating of ATETS's relative to major industrial and population centers. For example, the Odessa ATETS is located a distance of 25 km from the city. This requires the laying of expensive heat conduits, a considerable expenditure of pipeline (about 60,000 t of 1000-mm diameter) and the clearing of land for the transport of heat. In some cases, the construction of an ATETS can be limited by considerations of the selection of a site, the scarcity of systems water necessary in large amounts for cooling the condensers, the lack of demand for the electric-generating capacities and other reasons.

In connection with this, the USSR has developed a single-purpose heat source--a nuclear power plant with an individual unit thermal output of 500 MW (the AST-500). For utilization in the CEMA member nations, Soviet specialists have also developed a design for an AST of lower output (the AST-300 with an output of 300 MW), since the feasibility of using a reactor of 500-MW capacity in the majority of the countries is limited (with respect to the number of sufficiently large heat-consuming centers). With respect to its design, the AST-300 unit is similar to the AST-500.

Nuclear heat-supply plants are an essentially new nuclear power source, therefore it is advisable to dwell upon them in somewhat greater detail. In order to insure economic efficiency and to make them competitive with other types of heat sources, AST's should be located as close as possible to the center of heat consumption. This in turn gives rise to additional requirements for safety measures which should compensate for the AST's being located close to a city. Research into the type of reactor installation makes it possible to conclude that a water-modulated water-cooled vessel-type reactor whose design incorporates the following basic principles most fully satisfies the safety requirements that are imposed:

low pressure in the first circuit and moderate power loads in the core reduce the level of an accident's consequences and improve the reliability of the core cooling system;

natural circulation of the coolant in the primary circuit insures high reliability in the extraction of heat from the core;

an integrated layout of the equipment in the primary circuit makes it possible to reduce the degree of branching in the circuit to a minimum and avoid the use of large-diameter pipes which are potentially dangerous from the point of view of the possibility of massive depressurization of the circuit;

a two-shell layout in which the primary circuit is mounted within a safety jacket with a minimum of clearance, insuring that the core is bathed in coolant in the event of depressurization of the primary circuit and that the radioactive products are localized;

a three-circuit layout for cooling the reactor with an intermediate divider circuit, the pressure in which is lower than in the thermal circuit, thus excluding the possibility of a release of radioactive products from the reactor to the consumer through leaks in the surfaces of the heat-exchangers.

Basic Specifications of the AST-500 and AST-300 Reactor Installations

	Unit of measurement	AST-500	AST-300
Thermal output	MW	500	300
Coolant in the first circuit:			
Pressure	MPa	2.0	2.0
Temperature at input to/output from the core	°K	399/477	393/473
Surface of built-in heat-exchangers/ number of sections	m^2/pieces	5000/18	2000/15
Pressure in intermediate circuit	MPa	1.2	1.2
Thermal network:			
Pressure in network heat-exchanger	"	2.0	2.0
Temperature in the pressurized/ reflux collectors	°K	413/333	393/323
Core:			
Specific power load	MW/m^3	27.1	23
Diameter of nuclear fuel rods	mm	13.6/UO_2	13.6/UO_2
Number of cassettes	pieces	121	85

The designs incorporated in the AST insure the radiation safety of the population both under normal operations and in the event of possible emergency situations.

The calculations carried out for a nuclear power plant with two AST-500 reactors have shown that the emissions of radioactive products and the radiation dosages on site are considerably lower than permissible levels. Even for the most dangerous type of accident (with respect to the radiation consequences) with a rupture of an intermediate-circuit pipeline of 500-mm diameter, the value of the individual radiation dosages is lower by a factor of 10^4 than the limits of dosages established for the maximum calculated accident.

The layout insures the radiation safety of the population when network water is used by preventing the leakage of water from the intermediate circuit into the thermal network both under normal operation and in emergency situations. All this makes it possible to situate an AST with confidence in the immediate vicinity of heat-consumption centers right up to 2 km from the projected boundary of a city's built-up areas as regulated by standards now in effect in the USSR.

In the development of AST's, considerable use was made of designs that are traditional for nuclear power engineering in the USSR and have proven themselves suitable in practice in the operation of VVER- and RBMK-type reactors. This pertains to the selection of the fuel rods, the fuel-cassette casing, the servos for the control and safety systems, the cluster regulators and other struc-

tural elements. In addition to this, it was necessary to carry out an extensive series of scientific research and experimental design studies on the soundness of the designs that had been adopted.

In 1983, the Politburo of the CPSU Central Committee approved the recommendations developed by the USSR Council of Ministers regarding the construction and commissioning of nuclear-heat supply plants in the period to 1990. Pilot nuclear heat-supply plants with two units of 500-MW capacity each are already under construction in the cities of Gorkiy and Voronezh. The construction and start-up of these installations is of particularly great significance, since this will be the first practical experience obtained in the industrial introduction of large-scale nuclear heat-supply sources.

The nuclear heat-supply plant under construction in Gorkiy is located 2 km from the proposed city boundary and 10 km on the average from heat-consumption centers. The thermal capacity of the station is 1,000 MW (two units of 500-MW capacity each), which amounts to about 50 percent of the district heat-supply system under construction. The annual generation of thermal power in the system is more than 6 million GCal, including about 5 million GCal--that is, more than 80 percent--at the nuclear heat-supply plant. The overall length of the heat conduits exceeds 60 km, including 40 km of transit conduit. With the commissioning of this AST, 270 small-scale, low-efficiency, fossil fuel-burning boiler plants will be closed.

In this system of district heat supply, the storage of heat for equalizing the daily irregularities in the operation of the hot-water supply system was used for the first time for closed systems. Open tanks with a total capacity of 20,000 m^3 are being used as the storage units. The storage units make it possible to conserve up to 360 tons of standard fuel by using nuclear fuel at certain periods.

An important result of the work on the design of the heat-supply system at the Gorkiy AST is the formulation of the basic requirements for the developers of similar systems. These systems must be built according to a two-stage scheme. The first stage is the sources of heat (base and peak), united into a single power system by transit heat conduits. The second stage is the main conduits and distributing heat conduits and the consumer systems with the regulation of the output of steam. The transmission of heat from the first stage to the second should be accomplished at transforming units with the help of mixing pumps and heat exchangers. Such units should be located in regions where there is a demand for heat and at peak heat sources. It is necessary for these sources to be connected to the transit heat conduits in a parallel arrangement.

Technical and economic calculations have shown that the design of the district heat-supply system of the Gorkiy AST is most economical in comparison with possible alternate versions.

In the other CEMA member nations, research and studies are also being conducted in the area of nuclear heat supply.

The task of providing for the country's needs for heat energy in the CSSR will be solved through the creation of district heat-supply systems and the combined

generation of electric power and heat with the utilization of domestic types of coal and, in the near future, on the basis of nuclear heat-supply sources. Research shows that in the future the utilization of the latter will be the inevitable and almost sole possibility for supplying heat to the country's major economic centers.

The planned program for the utilization of nuclear sources should insure the release of thermal energy on the scale of 41,000 TJ/year and a saving of fossil fuel in the amount of 1.6 million tons of standard fuel. By the year 2010, it will amount to 4.7 million tons of standard fuel.

The resolution of the Presidium of the Government of the CSSR regarding the transition of condensing electric power plants to district-heating operations likewise envisions the delivery of heat from all nuclear power plants currently under construction. This concept will require the creation of large-scale regional systems of centralized heat supply. The construction of boiler plants and small district heating plants will be limited, as a result of which there will be a considerable reduction in the unfavorable effects of local heat sources on the environment.

It has been proposed that the CSSR first of all use AES's with the bleed-off of steam and ATETS's as well as AST's as nuclear sources of heat.

At all AES's with VVER-440 reactors currently operating or under construction (a total of 12 units) in the CSSR, it has been proposed that steam be bled off for supplying heat to the cities nearby. The Bogunice AES will supply heat to the city of Trnava, the Dukovany AES to Brno and the Mohovice AES to Levice. In delivering heat (hot water at 150/70°C) from one unit of an AES equipped with Skoda condensing turbines (2x220 MW) but not specially fitted out for district heating bleeds (AES V-1, V-2), one can bleed off a maximum of 170 (2x85) MW (t.). A later modification of the 220-MW Skoda turbine (for the Mohovice AES) is designed to bleed off up to 230 MW from one unit for central heating needs.

As an example, let us dwell upon a study carried out by Czechoslovakian specialists regarding supplying heat to the city of Brno from the Dukovany AES. The planned deliveries of heat amount to approximately 500 MW, and the length of the heat conduit is 40 km. The heat-delivery system is closed and is provided with two pipelines of 1,000-mm diameter (24,000 tons of pipeline). The supply of equipment (pipes, pumping stations, etc.) can be carried out by domestic industry. A new pipeline network for centralized heat supply is already under construction in the city. The capital investment will be recouped in 10 years. An analysis has shown that the delivery of heat from an AES is the only feasible and economically profitable solution for a centralized heat-supply system for the city of Brno.

A characteristic feature of the CSSR is the preponderance of thermal loads in some regions which require steam not only for technological but also heating purposes. Czechoslovakian specialists are now studying the feasibility of supplying steam from the Temelin AES (with VVER-1000 reactors) for a system of centralized heat supply in the city of Ceske Budejovice.

The utilization of nuclear heat-supply plants in Czechoslovakia is proposed in those cases when the centers of heat consumption are located beyond the limits of the economically expedient transport of heat from nuclear power plants or fossil fuel-fired TETS's. In the first stage, plans have been made to utilize AST-300's in the Ostravsko-Karvinskiy complex to 1995 and in Bratislava to 2000. For these specific cases of application, research and studies on the selection of construction sites have already begun.

The utilization of AST's with outputs of 500 and 300 MW under the conditions found in the CSSR is limited; installations of lower capacity could find more extensive application. In connection with this, it has been proposed that we develop AST's with outputs of 100 to 200 MW. In this case, in the opinion of Czechoslovakian specialists, it is advisable to examine new conceptual designs.

Czechoslovakian industry possesses extensive potentials for participating in the production of equipment for AST's.

Specific programs for the utilization of nuclear heat-supply sources have yet to be adopted in Poland. Calculations and design studies for the construction of ATETS's and AST's are being conducted.

The construction of ATETS's with VVER-1000 reactors is advisable only in the largest housing and industrial centers; in the Warsaw agglomeration (to the year 2000); in the regions of Silesia and Krakow (after 2000). In the years 1990-2000, the country can use up to eight AST's with outputs of 500 or 300 MW. In view of the high individual outputs of the units, their application is limited to certain major heat-consumption regions: Silesia, Krakow, Gdansk, Poznan, Szczecin and Lodz. In addition to this, within the country there are many relatively small cities where the question of supplying heat and protecting the environment is of a particularly critical nature. In these regions, it would be advisable to utilize AST's; however, it is necessary to develop units with outputs of 100 to 200 MW. Studies are now underway in Poland on a reactor installation for an AST with an output of 200 MW.

The feasibility of supplying heat to the Gdansk agglomeration through the use of nuclear power is under examination. The main heat-consuming center is a region of three cities: Gdynia, Gdansk and Sopot (total heat consumption of 3,140 MW). The planned socioeconomic development here presupposes an increase in thermal output of 116 MW per year on the average. Until 1990 this growth will be provided for by coal-fired TETS's, after which new sources of energy will be required. In connection with this, specialists are discussing construction versions of a single AST with reactors of 500-MW capacity or two AST's with reactors of 300-MW capacity, as well as a version utilizing the bleed-off of heat from the Zharnovets AES. In the latter case, the limiting factor is the rather long distances over which the heat must be transported (50 to 80 km).

The orientation in the production of energy toward domestic raw materials--lignite--has been established by the directives of the 10th Congress of the United Socialist Party of Germany. As a result of the expansion in the use of lignite, it is impossible to expect a reduction in the degree of shortage, even with an increase in mining of up to 300-310 million tons by 1990. One can make a judgement regarding the prospects for heat supply from nuclear sources in East Germany

based on the fact that at the present time it is necessary to burn 80 million tons of lignite annually for centralized heat supply alone.

Since AES's and ATETS's must be removed from major population centers at a great distance due to safety considerations and, as a result, the construction of expensive heat conduits is required, specialists from East Germany are assessing how suitable the application of AST's is for heat supply to cities.

East Germany is examining the feasibility of utilizing AST-500 reactors based on the particulars of constructing such installations in the GDR. It has been noted, for example, that the input and output temperatures realized basically coincide with the conditions in large-scale district heating systems in the GDR, including the conditions within the Berlin system, the largest in the country. The application of high-output AST's is limited, despite the economic advantages: the country has five district heating systems of from 500- to 1,000-MW capacity and one system of more than 1,000-MW capacity. Single and twin-unit AST's are being examined.

In East Germany, theoretical and experimental research is being expanded in the areas of thermohydraulic processes, the dynamics of AST reactor units, the storage of heat, etc. Experimental units have been built for these purposes in the Dresden Technical Institute and the Zittau Higher Engineering School. Studies are being conducted on the extraction of heat from the currently operating Bruno Leushner AES. Also underway are preparations for the manufacture of non-nuclear equipment for nuclear heat-supply sources through the efforts of domestic industry.

Insufficient reserves of domestic power resources in Bulgaria have dicated the pressing need to utilize nuclear heat sources. Industrial loads play a deciding role in the development of centralized heat supply in Bulgaria. All TETS's are built for supplying heat to industrial zones while at the same time generating heat for domestic heating and hot-water supply. As a result, in 1980-1982 the percentage of fuel expended for centralized heat supply to industry amounted to 55 to 60 percent, while for housing the figure was only 10 percent.

There are 27 centralized heat-supply systems in the country. Both industrial zones and population centers are characterized by small to medium-size thermal loads. By 1990, for example, heat loads in excess of 1,000 MW are expected in only two cities--Sofia and Plovdiv. Only in three other cites will the heat load amount to 500 to 1,000 MW. Therefore, for the conditions found in Bulgaria, nuclear heat-supply sources with outputs of from 100 to 500 MW will be necessary in the future both for industrial heat supply and for domestic needs. Installations with outputs of 500 to 2,000 MW can be utilized only in isolated cases. Bulgarian specialists are proposing to examine the feasibility of creating nuclear heat sources with outputs of from 100 to 200 MW for satisfying the country's specific requirements.

Nuclear heat-supply sources are causing interest not only in the CEMA member nations but also in many developed capitalist countries, particularly in countries with moderate and cold climates. Well known is the 200-MW SECURE AST project, developed jointly by Swedish and Finnish companies and intended for supplying heat to cities with populations of 50,000 to 100,000. France has devel-

oped the 100-MW THERMOS low-temperature nuclear heat source with pool-type reactor and integral equipment layout. Canada is studying the feasibility of utilizing low-output (from 2 to 20 MW) nuclear heat sources in the northern regions of the country. A number of countries have practical experience in extracting heat from AES's for heat supply.

Technical and economic studies have shown that nuclear heat-supply sources are quite competitive with installations that burn fossil fuels. The higher capital expenditures are compensated for by the reduction in the cost of heat production. One AST with an output of 1,000 MW is capable of providing heat to urban areas with populations of 300,000 to 400,000 people, the annual saving in fuel amounting to more than 700,000 tons of standard fuel. Likewise in the favor of nuclear heat sources are their undeniable advantages in relation to maintaining the purity of the environment.

Nuclear heat supply is taking its first steps as a new direction in nuclear power engineering. A great deal of time and effort will be required for the introduction of nuclear heat-supply sources in the CEMA member nations on an industrial scale. Multilateral cooperation among the CEMA member nations should be an important factor on the road to accelerating this process.

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NUCLEAR POWER

RADIATION SAFETY MEASURES FOR AES'S EXAMINED

Moscow EKONOMICHESKOYE SOTRUDNICHESTVO STRAN-CHLENOV SEV in Russian No 3, Mar 84 pp 47-49

[Article by Alejandro Bilbao Alfonso and Wilhelm Stregober, members of the CEMA Secretariat: "Insuring the Radiation Safety of AES's"]

[Text] An increasingly significant position is being given to nuclear power in satisfying the fuel and power needs of the CEMA member nations. Contributing to this is the successful resolution of those problems set forth by the Comprehensive Program for the creation of the scientific-technical, production and organizational prerequisites for the accelerated growth and effective introduction of nuclear power into the economy on an industrial scale through the efforts of the fraternal nations.

As a result of the activity within the framework of the Permanent CEMA Commission for Cooperation in the Area of the Utilization of Nuclear Power for Peaceful Goals and the Permanent CEMA Commission for Cooperation in the Area of Electric Power with regard to the questions of scientific-technical cooperation as well as those questions associated with design and construction and installation work and the operation of nuclear power plants, conditions have been created for the integrated development of nuclear power programs. They are based on a coordinated determination of the scale of AES construction, on the standardization of reactor units and on specialization and cooperation in the production of equipment for AES's in the CEMA member nations. Plans have been made to bring their total output up to approximately 100,000 MW in the next decade. Attention is being devoted to the utilization of nuclear power for heat-supply, the requirements of these nations for nuclear sources of heat are being determined and an evaluation of individual outputs is being made.

Many years of experience in the operation of nuclear power installations, primarily AES's, have confirmed their high reliability and safety for the environment and demonstrated their economic and ecological advantages in comparison with thermal fossil-fuel electric power plants.

In the development of the nuclear power industry in the CEMA member nations, an important place is occupied by cooperation in the area of insuring radiation safety. This is being accomplished according to the Overall Expanded Program for Cooperation Among the CEMA member nations for 1981-1985 in the Area of the Protection and Improvement of the Environment and the Associated Efficient Use

of Natural Resources. The chief goals in this are the development of standardization and methods documentation for use in the CEMA member nations, the efficient utilization and mutual exchange of the results of studies and the development of unified approaches in the drafting of standardization documentation with respect to insuring radiation safety. Cooperation makes it possible to efficiently utilize the scientific-technical potential available in these countries. It also has a positive influence on equalizing the levels of knowledge and improving the quality of the work being done.

In insuring the radiation safety of nuclear power plants, primary attention is being devoted to engineering and technical measures for preventing emergency situations. This is the chief factor precluding the possibility of a worsening of the radiation situation at an AES and in the environment. Moreover, monitoring measures, including technological and dosimetric monitoring at AES's and the monitoring of the population and the environment, are also important.

Based on the increasing significance of the protection of the environment and the further development of joint studies on insuring radiation safety on a multilateral basis, the Permanent CEMA Commission for Cooperation in the Area of the Utilization of Nuclear Power for Peaceful Goals established the following directions for further cooperation at its 43rd session (December 1982).

1. The Development of Standardized Technical Documentation Regarding Safety Measures at AES's

In connection with the growth in the number of AES's and the rise in their unit outputs as well as the increasing closeness of nuclear power plants to regions of high population density, the question arises regarding a further reduction in the levels of radiation through increasingly stringent standards and requirements directed at improving the level of safety at operational and planned nuclear power plants. Serving this goal are the Health Regulations for the Design and Operation of Nuclear Power Plants which have been approved in the USSR and which contain requirements with regard to all aspects of safety for AES personnel and the population. These regulations can be made to be the basis for the development of domestic standards in the CEMA member nations that take into consideration the national characteristics of each of these countries. The regulations give a dosage quota for AES's which is equal to 5 percent of the maximum dose for an individual on the boundary of the health and safety zone and thus determine the maximum allowable emission of radioactive aerosols and gases that give radiation doses comparable to radiation doses from natural sources of radiation. Experience gained in the operation of commercially produced AES's with VVER-440 reactors in Bulgaria, Hungary, East Germany, the USSR and the CSSR that had generated more than 100 reactor-years of electric power by 1983 testifies to the safe radiation situation within these AES's and to the reliable guarantee of radiation safety for the service personnel. For example, in summing up the data on the levels of radiation received by the personnel in these AES's, it is shown that the individual average annual doses do not exceed 0.1 to 1.5 rems per year. The individual dose of external radiation received by the overwhelming majority of personnel does not exceed 20 percent of the maximum allowable yearly dose (5 rems). Studies confirm the

fact that personnel receive individual radiation doses mainly during the loading and unloading of nuclear fuel and during the accompanying maintenance operations on the main equipment in the first circuit of the AES. According to operational data, from 60 to 85 percent of the annual dosage is attributable to the reloading of fuel and the maintenance operations. Based upon the requirement to reduce the personnel's radiation to the minimum level possible within the framework of multilateral cooperation, tasks have been established regarding the development of requirements and measures for further reducing the dosage of those personnel who are engaged in reloading and maintenance operations. This pertains first of all to the improvement of lay-out and assembly designs for the production areas of the reactor installation with its division into "free" and "restricted" zones that will localize radioactive contamination within the limits of the restricted zones. It will also be necessary to divide the complex of work areas for the efficient pre-maintenance decontamination and repair of equipment, to apply protective and technical measures and devices and to improve the personnel's qualifications.

2. Improving the Organization and Methods of Dosimetric and Radiometric Monitoring at AES's and in the Environment

An important position in this cooperation is devoted to modern methods of radiation monitoring at AES's. Coordinated programs for this monitoring and requirements for the systems for carrying it out have been developed. A great deal of attention is being given to the creation and application of systems for monitoring the environment of the AES through the utilization of automated devices, remote measuring equipment and computers. The application of remote measuring equipment insures continuous observation of radiation parameters in the atmosphere surrounding the AES. In the event of the uncontrolled release of radiation, remote measurements make it possible to take urgent measures among the population living in the vicinity of the AES.

When connected to automated monitoring systems, a computer serves to store and gradually process data in its normal operating mode as well as to quickly convert this information into a form that is immediately suitable for implementing measures to protect the population. The systems of radiation monitoring along with the information functions should in the future encompass all possible factors involving the effects of radiation and should have control functions. The development of computer technology and the appearance of inexpensive microprocessors and microcomputers make it possible to solve the problem of radiation monitoring at AES's in a new fashion and to take the next qualitative step in the creation and improvement of these systems.

3. The Study of the Radiation Consequences of Possible Emergency Situations at AES's

A nuclear power station is a technically complex installation where, despite the high demands for reliability placed upon the equipment, individual malfunctions and failures of the equipment are possible which could lead to emergencies with radiation consequences. For this reason, an important direction in this multilateral cooperation is the timely study of such emergency situations, primarily the analysis of the initial events and the paths by which the consequences of emergencies develop, particularly within the AES. In connec-

tion with this, the CEMA member nations have adopted the Classification of Emergency Situations at AES's, on the basis of which joint studies have been conducted on assessing the limits of propagation and the effects of radioactive substances for various classifications of accidents. The calculations show that in the case of the maximum calculated accident, the doses of radiation received by the population at the boundary of the health and safety zone at a radius of 2 to 3 km will not exceed the maximum allowable values established by the standards. Only in the case of a hypothetical accident could the necessity of implementing measures to protect the population arise. Since the guarantee of radiation safety should be preventive in nature, this cooperation in the future will also be directed toward the organization of a defense for the environment in the event of an accident at an AES. In this case, it has been taken into consideration that for an effective defense it is necessary to have coordinated and detailed preliminary planning of all protective measures, constant readiness to implement them, the corresponding outfitting of territorial agencies and AES personnel, the guarantee of communications and the means to interpret the radiation situation and an accounting of the meteorological conditions. In an effort to accomplish this, general principles have been developed for preparing and implementing measures to protect the population in emergency situations at AES's in the CEMA member nations.

4. Summarizing the Experience Gained in the Utilization of Individual Protective Equipment for AES Personnel

In the overall system of measures for insuring the radiation safety of AES personnel, an important role is played by the utilization of individual protective equipment (SIZ) when carrying out all operations associated with the probability of radionuclides making their way to the surface of the skin or being absorbed into the body. In connection with the fact that the development and standardization of individual protective gear are included among the important areas for cooperation, health and hygiene requirements for such gear have been drawn up and agreed to for utilization among the CEMA member nations. As early as the design and construction stages of an AES, attention should be devoted to an efficient solution to questions regarding the individual protection of personnel during maintenance operations. It must be taken into consideration that a great many additional personnel are enlisted in maintenance operations. In this case, the individual protective gear, namely sealed suits, equipment to protect the respiratory system, special clothing and footgear, gear for protecting the hands, eyes and head and combination individual protective gear, should insure working conditions that would not lead to the appearance of unfavorable changes in the bodies of the personnel. Considering the fact that nuclear power is finding greater and greater application in the CEMA member nations, the task of developing requirements for further improvement in the standardization and optimizing of the individual protective gear for personnel at AES's under various operating conditions lies within the framework of multilateral cooperation. Such requirements will insure the proper approach to the development, assessment and application of individual protective gear in an effort to improve its reliability and to insure safe working conditions for AES personnel and those who work with radioactive substances in other sectors of industry.

5. The Study of the Radiation Situation in Areas Where AES's Are Located

Experience in the operation of AES's with VVER-440 reactors in the CEMA member nations testifies to the reliable guarantee of radiation safety for the population and the environment. The radiation output from radioactive gas emission at such AES's amounts to approximately 3-5 Ci/day (less than 1 percent of the maximum allowable emission) for each power unit. This points to the fact of the sufficiently high hermetic nature of the technological equipment in the first coolant circuit and of the good operation of the filters used to trap the radioactive gases. With such a low level of emission of radionuclides into the environment, the impact of these AES's on the environment is practically nonexistent and the density of radioactive fallout, the concentration of radioactive aerosols and their radionuclide components in the area where the AES is situated correspond to global levels. Experience in the operation of AES's also shows that the annual radioactive liquid wastes with unbalanced water from AES's are negligible. They do not exceed the maximum allowable design values and have practically no effect upon the environment. The continuation of the study of the radiation situation in areas where AES's are situated and the exchange of experience among the CEMA member nations will make it possible to refine the methods used to calculate the radiation dosages, the methods for determining low concentrations of radionuclides and their distribution for establishing technically based standards for the values of emissions and wastes from AES's.

6. The Investigation of the Radioactivity of Water Systems [Baltic Sea, Danube River] Which Are of International Significance

Over the course of several years, the CEMA member nations have been studying the radiation situation for the above-named international water systems. It must be mentioned that one of the specific natural characteristics of the Baltic Sea is its high biological productivity. In accordance with a program of research by the Baltic member nations of CEMA in 1976-1980, it was revealed that a hygienic assessment of the radiation situation in the areas of the Baltic Sea under investigation makes it possible to consider the situation safe. It has been established that the pollution of the sea is primarily the result of radioactive fallout from the atmosphere. Further research will make it possible to establish the maximum allowable control concentrations for the most significant radionuclides in this water region which would determine the criteria of safety for both the population and the flora and fauna in the basin.

A study of the radiation situation in the Danube River in 1977-1980 established the fact that the levels of radioactivity were in close accordance with the values of radioactivity inherent in flowing surface basins and were basically dictated by natural radioactive substances and partially by radionuclides of global origin. The effective equivalent dosage of internal radiation for the population when using the water and eating the fish from the Danube amounts to approximately 2 percent of the radiation quota apportioned for the effects of liquid AES wastes as established by USSR hygiene legislation. The calculations of the Danube population's external level of radiation amounts to only 4 percent of the total dosage. The continuation of the study of the radiation situation on the Danube will make it possible to assess according to an agreed-upon method the annual doses received by the population due to radioactive pollution of the water.

7. Collation of the Methods and Instruments Used for Dosimetric and Radiometric Monitoring

The methods for measuring the dosage of chronic and accidental radiation in the combined fields of neutron and gamma radiation and for measuring the dosage of beta radiation have been collated within the framework of multilateral cooperation. This collation has as its goal the further development of dosimetric systems and the guarantee of comparability of measurement results and the working out of unified methods of dosimetric and radiation monitoring in the CEMA member nations. The studies that have been conducted have initiated cooperation within the CEMA framework in the area of the creation of unified standardization and technical documentation regarding the means and methods of radiation monitoring, the improvement of the methods and instruments and the generation of recommendations for the application of the best of them in the fraternal nations.

The intensification and expansion of multilateral cooperation among the CEMA member nations in the area of insuring the radiation safety of AES's with respect to these directions is a prerequisite for the broad application of nuclear power in our countries.

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NON-NUCLEAR POWER

500 KV LINE OPERATES BETWEEN INGURI AND STAVROPOL

Moscow IZVESTIYA in Russian 13 Nov 84 p 2

[Article by IZVESTIYA staff correspondent T. Chanturiya, reporting from the GSSR: "Power Lines in the Clouds"]

[Text] The recently completed high-power lines between the Inguri GES and the Stavropol GRES have become operational, providing a reliable link between all of the power systems of the Transcaucasus area and the rest of the country. Construction and installation crews from the Kavkazelektroset'stroy firm completed the difficult route in near-record time.[in boldface]

The route employed reaches altitudes of up to 3000 meters above sea level. The meteorological implications of this allow only 4 to 5 working months out of the entire year. Three passes were cleared, totalling 610 kilometers in length...

"The worst thing we could have done was wait," says G. Saralidze, the head man of Kavkazelektroset'stroy. "Nature had saddled us with a pretty tough timetable: we could only work during the summer months. And so, with such an intensified work schedule, we really had to apply ourselves. We applied established techniques for high-speed installation of transmission lines to the unique requirements of high elevations, and we made use of a number of innovative approaches. As a result, we managed to complete the entire route in 20 months, instead of 48 as projected. In September, we had already begun to depart from work sites along the route...

"The fact of the matter was that we couldn't afford the luxury of more leisurely engineering concepts. For the first time, we erected supports without the use of reinforced concrete--it would have been too expensive, cumbersome and difficult to haul it into the high mountain areas: we devised a special method for putting down so-called crushed rock, and then raising the supports. We tested out the high-strength cables (manufactured to our own specifications) necessary for the gigantic spans involved. This was the first time that helicopters had been used at such high elevations, and they provided considerable assistance to the line installers. And in locations which were inaccessible to helicopters, supports were erected using the incremental method. This also was employed for the first time under high mountanous conditions. Materials were hauled up mountain sides with the use of a special escalator device--an innovation which was developed during the course of the project..."

The power transmission lines are now under the control of a new proprietary agency--Consolidated Dispatching of United Power Systems in the Transcaucasus Republics. The head of this agency, A. Petriashvili, is quoted below.

"The 500 kV line provides for a stable and reliable supply of electric power to economically important consumers, as well as the free interchange of power between systems. For instance, in the summer, when river levels are high, surplus electric power generated by the Inguri system assists the North Caucasus power system, while at other times, the current will flow the other way--from north to south. The ability to manipulate the flow of power in this way was dramatically increased with the introduction of this new line. These kinds of manipulations will enable us to forestall emergency power crises--consumers simply will not be affected by them."

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NON-NUCLEAR POWER

PLANS OUTLINED FOR NEW HYDROELECTRIC STATION AT KIRZAN

Baku VYSHKA in Russian 4 Nov 84 p 1

[Article by unnamed AzerINFORM correspondent in Tauz: "Kirzan GES Being Planned"]

[Text] The day is not far off when construction will be underway on a large new hydroelectric power complex at the midcourse of the Kura River. The technical and economic requirements for construction have been met for the Kirzan GES, which was designed by specialists from the Baku branch of the Gidroproyekt [All-Union Order of Lenin Planning, Surveying and Scientific Research] Institute imeni S. Ya. Zhuk.

The new hydrosystem will become the third stage of the middle-Kura series of hydroelectric stations. The planned station will have a power capacity of 380,000 kilowatts. It is designed to generate 850 million kilowatt-hours of electrical energy per year, which will increase the power supply to rapidly expanding industry and agriculture in the western region of Azerbaijan. An earthen dam, many kilometers in length, will confine the river to its narrow channel and aid in the formation of an enormous water reservoir holding approximately 1,740,000 cubic meters. It will extend for tens of kilometers along the course of the Kura. A large part of the water accumulated here will go to irrigate thousands of hectares of cropland.

A decree issued by the USSR Ministry of Power and Electrification makes note of the outstanding work which went into the development of the technical and economic planning for the station. Hydroelectric construction workers and power engineers will be housed in a planned settlement not far from the site of the hydrosystem, and 21 million rubles have been earmarked for the construction of housing, shopping, recreational and cultural facilities.

A solid foundation for productive capacity will be laid down, and roads will be built to connect Tauz and the Baku-Kazakh highway with the construction site. Recreational areas, parklands and fisheries will flourish on the shores of the Kirzan sea.

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NON-NUCLEAR POWER

BRIEFS

NEW USE FOR WASTE-ASH--Ryazan--A cost-effective use has been found for the major part of the ash formed during the burning of coal at the Ryazan GRES. It will now serve as filler material in the manufacture of pliable roofing. The necessary equipment for recovering and processing this raw material has already been installed at the GRES. The ash will be hauled to the Ryazan roofing materials plant, where it will replace the talc which is now being shipped there in large quantities from the Urals. Thanks to the cheaper raw material and the sharply reduced transportation costs, the plant will realize an economic benefit totaling 250,000 rubles annually. The Ryazan planning and design organization, Orgkrovlya, is initiating the processing of technical documentation on replacing talc with ash for roofing plants in Kuybyshev, Cheremkhov, Dorogobuzh, Vyborg and Gorkiy, as well. [By Yu. Kazarin] [Text] [Moscow EKONOMICHESKAYA GAZETA in Russian 23 Nov 84 p 2] 9481

VOLGA POWER PLANT EXPANDING--Cheboksary--The 14th power unit has been put on industrial-demand output at the Cheboksary GES. With the approach of October here, the annual plan for electric power generation had been fulfilled well under the timeline: since the beginning of the year, more than 1.8 billion kilowatt-hours have been consumed by newly constructed facilities in the Volga River area and settlements in the Nonchernozem region. The lights of the Cheboksary GES--the final stage in a series of hydropower stations on the Volga--are shining brighter all the time. Right now, well ahead of schedule, power plant workers are busy installing the next turbine unit--the 15th--which should be putting out current before the end of the year. With the start-up of all 18 power units by the end of the five-year period, the plant capacity will reach 1.4 million kilowatts. [Text] [Moscow SEL'SKAYA ZHIZN' in Russian 10 Nov 84 p 1] 9481

EKIBASTUZ POWER PLANT PROGRESS--Engineers at the Ekibastuz GRES-1 station have brought the seventh power block up to its designed power rating of a half million kilowatts well ahead of schedule. Increased staff accountability and clearly defined responsibility have made it possible to maintain the unit at maximum load with fewer service personnel. A collection of skilled workers, armed with this valuable experience, is being assembled for work on the eighth, and final power block. [Text] [Moscow EKONOMICHESKAYA GAZETA in Russian No 41, Oct 84 p 9] 9481

CSO: 1822/105

PIPELINE CONSTRUCTION

PIPELINE WORKERS' 1985 OBLIGATIONS STATED

Moscow TRUD in Russian 25 Dec 84 p 2

[Article: "Socialist Obligations"]

[Excerpts] Organization and enterprise collectives of Glavtruboprovodstroy [Main Pipeline Construction Administration] of the Ministry of Construction and enterprise collectives of the oil and gas industry have accepted their Socialist obligations for 1985.

While putting into practice the historic decisions of the 24th Congress of the CPSU and subsequent plenary sessions of the CPSU Central Committee, work collectives of Glavtruboprovodstroy successfully fulfilled their plan assignments and Socialist obligations for 1984 and for 4 years of the current 5-year plan. Pipeline sections on the Urengoy-Tsentr I and Urengoy-Tsentr II pipelines extending more than 1,800 kilometers were put into operation ahead of schedule. Also nine pipelines and branches to thermal power plants have been built and put into operation; this makes it possible to save a substantial amount of fuel oil. Labor productivity has risen beyond that planned by 2 percent. The cost of construction and assembly operations has been reduced additionally by 0.6 percent.

Socialist obligations accepted for 1985 include:

--to put an 800 kilometer section of the Yamburg-Yelets I Pipeline into operation in 1985, a year ahead of schedule; to put a 700 kilometer section of the Kholmogory-Klin Oil Pipeline into operation a month and a half ahead of schedule; to hook up ahead of schedule 6 large thermal power plants to the gas transportation system which will require construction of 390 kilometers of pipeline and branch lines. Another is to lay more than 300 kilometers of industrial pipeline in the Tyumen Oblast as part of a counter-plan which will facilitate the transportation of oil from two fields. All of these projects must be completed with excellent and good quality ratings;

--to expand work on the careful use of materials and fuel, to save 950 tons of metal, 5,200 cubic meters of lumber, 1.9 million kilowatt hours of electric power, 10,200 gigacalories of thermal power and 2,600 tons of gasoline and diesel fuel, and to operate not less than two days on the resources saved. To obtain one million rubles of profit over plan.

The Socialist obligations were discussed and accepted at meetings of the work collectives of Glavtruboprovodstroy.

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PIPELINE CONSTRUCTION

PIPELINE PROGRESS REPORT FOR NOVEMBER

Moscow EKONOMICHESKAYA GAZETA in Russian No 51, Dec 84 p 7

[Article by G. Veselkov: "On the Gas Pipelines in November"]

[Excerpts] In November with the advent of freezing weather, operations have started up along a wide front at the North Tyumen and other difficult access swampy sites on the Urengoy-Tsentr II pipeline where during the summer it was impossible to carry on construction. The pace of pipe laying on this pipeline grew by a factor of 2 in November in comparison with October's pace and was 10-12 kilometers a day. Thirty spreads operate on the pipeline. In November they insulated and laid about 300 kilometers of pipeline in contrast to 150 in October. Thus, by the beginning of December a total of more than 2,100 kilometers have been made ready--more than two thirds of the total length of the pipeline.

Many of the leading construction units from Glavtruboprovodstroy [Main Pipeline Construction Administration], Glavsibtruboprovodstroy [Main Pipeline Construction Administration for Siberia] and Glavvostoktruboprovodstroy [Main Pipeline Construction Administration for Eastern Regions), having completed line operations at their sites, are speeding up testing and preparation of the pipelines for start-up. As of December 1 more than a dozen pipeline sections have been put into operation. They stretch a total of 940 kilometers, 400 kilometers of which were completed in November, and they provide a substantial addition to the transporting capacity of Tyumen gas to the central regions of the country.

In order for the construction units to fulfill their obligation (basically, to complete lining work on the Urengoy-Tsentr II Pipeline and to provide gas delivery on it in January instead of December 1985), the units must increase the pace of construction by a factor of at least 2 and lay in a month not less than 600 kilometers of pipeline. Minneftegazstroy [Ministry of Construction of Petroleum and Gas Industry Enterprises] has given production units this task. Construction workers together with work units from Mingazprom [Ministry of Gas Industry] and other ministries are now working to complete this task.

The customer requires that the supplying of the operation with crane units, compressor station hook-up units and other lacking equipment be speeded up. Construction and transportation workers must give special attention to the manufacture, delivery to the pipeline and installation of steel reinforced concrete materials.

Work units from Minneftegazstroy, Minenergo [Ministry of Power and Electrification], Minstroy [Ministry of Construction], Mintyazhstroy [Ministry of Construction of Heavy Industry Enterprises] and Minpromstroy [Ministry of Industrial Construction] are strenuously working on the construction of compressor stations on the Urengoy-Tsentr I Pipeline. Thirteen of the 29 planned stations for the year have been put into operation on the pipeline during the first 11 months of the year. The remaining 16 will have to be put in operation in December. It is necessary to step up operations during the remaining days of the year, primarily at compressor stations where substantial delays have been noted, including stations at Urengoyskaya, Tayezhnaya, Pelymskaya, Agryzskaya, Torbeyevskaya and a number of others.

At the same time the pace of operations at compressor stations under construction on the Urengoy-Tsentr II Pipeline must be accelerated. According to plan they should be put into operation during the first half of 1985. Only 25 percent of the construction and assembly work planned for the year at these stations was completed during the first 11 months.

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PIPELINE CONSTRUCTION

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IMPROVEMENTS IN PERMAFROST GASLINE CONSTRUCTION METHODS VIEWED

Moscow STROITEL'STVO TRUBOPROVODOV in Russian No 10, Oct 84 pp 12-13

[Article by V. N. Yagovkin of Glavsibtruboprovodstroy in Tyumen: "The Use of Scientific Potential in Building Large-Diameter Pipelines in Western Siberia"]

[Text] The subdivisions of Glavsibtruboprovodstroy [Main Siberian Administration for Pipeline Construction] have gained definite experience in working out and introducing modern construction methods. This has been aided by drawing upon the scientific and design forces of the related ministries and departments the technical specialization of which matches the problems of development in Western Siberia.

Let us examine the developments over the period since 1981 which have been done on economic contract bases and are successfully being employed.

First of all these are the new methods of laying pipelines under the conditions of the north of Tyumen Oblast as carried out by the VNIIST [All-Union Scientific Research Institute for Large-Diameter Pipeline Construction].

The high degree of flooding of the Western Siberian territory, the presence of permafrost which loses its bearing capacity in thawing and its poor retainability substantially influence the pipeline construction times. For this reason, new design solutions are needed which provide a high work pace and reliability of the constructed systems. With the traditional underground laying under these conditions, it is essential to ballast the pipeline for virtually its entire length.

There are also great difficulties involved in earthmoving which over significant areas can be done only during the winter period. Practice has shown that under the conditions of Tyumen Oblast it is possible for the pipelines to float up and shift, destroying the embankments. For providing the dependability of the constructed systems a method worked out by the VNIIST was employed for rationally combining ground-level exposed and underground laying as well as ballasting with a nonwoven synthetic material. All of this was employed in building the gas lines to Novopskov, Petrovsk and Uzhgorod.

Glavsibtruboprovodstroy and the Orgtekhtruboprovodstroy [Pipeline Construction Engineering] Trust have developed a method of ballasting using AR-401 anchors.

The AR-401 anchors which possess great bearing capacity have made it possible to speed up the construction of the large-diameter pipelines and here the cost of the ballasting has been significantly reduced.

For several years, we have successfully been employing in hydraulic testing of the large-diameter pipelines a method of discovering leaks in the pipeline using a dye developed by the Tyumen Tool Institute. Over 1,400 km of pipeline have been tested. The economic effect was 860,000 rubles with development expenditures of 130,500 rubles.

Attention should also be given to the method of building crossings over ice with the installation of thermosiphons as proposed by the VNIISt KF [Design Factory].

In Western Siberia, crossings over rivers are built by the method of layered freezing. The use of these crossings in the given instance does not always make it possible to satisfy the requirements for transporting the loads and the passage of construction equipment in terms of dates and load-bearing capacity. The first stage in development was the erecting of a roadway in the winter period across small streams to 7 m deep. Reinforcing was achieved by building ice supports (columns) beneath the crossing by freezing with thermosiphons. At present, work is underway to develop designs making it possible to increase the bearing strength of the ice cover without the bottom ground on large rivers. All of this will make it possible to significantly accelerate the placement of equipment along the route in the winter season.

Western Siberia is widely employing the technological ideas worked out by the Tyumen Tool Institute for intensifying pipeline construction. An effective device has been developed for the interlayer cleaning of the welded seam surface of slag. An experimental model has been tested at the Severtruboprovodstroy [Northern Pipeline Construction] Trust. On the headers of the Urengoy Deposit they have tested an induction heater for the preliminary heating of the joints of the 1,420-mm diameter pipe prior to welding. The flameless installation is marked by high heating productivity and safe use. At present, the institute is developing a method for a thermomechanical method for cutting trenches in permafrost ground.

The VNIIzemmash [All-Union Scientific Research Institute for Excavating Machinery] is developing chain working equipment for digging ditches in permafrost ground. A fundamentally new cutting device was required capable of cutting trenches 300-350 mm wide and up to 3 m deep in areas with permafrost ground. The successful development of such equipment will make it possible to employ the slot-explosive method in the process of digging the trenches for the large-diameter gas line. All of this will increase the efficient use of construction equipment, it will increase labor productivity and as a whole will significantly reduce the cost of excavating.

The building of large-diameter gas lines in permafrost areas creates the problem of developing new thermal insulating material. Here it is essential to consider the scarcity of raw materials, their cost and transportability. At present, in the settlement of Belyy Yar they have produced the first thousand cubic meters made from bulked vermiculite and a method is being developed for

producing thermal insulating slab. A method for the thermal insulating of large-diameter pipe has been developed by SibNIPIgastroy [Siberian Scientific Research and Design Institute for Gas Line Construction].

Practice has shown that in Tyumen Oblast, in line with the remoteness of the facilities being built from supply bases and the lack of sufficiently reliable means of transport and roads for such conditions, it is economically ill-advised to employ reinforced concrete pilings for foundations beneath the gas-pumping units. For this reason at present a majority of the piling foundations for the natural gas pumping stations is being built from steel pipe. The metal piling developed by the Tyumen Engineering-Construction Institute with a support widening in the form of opening blades will make it possible to substantially increase the bearing capacity.

The listed examples confirm the high effectiveness of the contractual work being carried out.

However, great difficulties have arisen on the path of implementing the completed developments. In particular, it is essential to set up a special experimental facility both at Glavsibtruboprovodstroy and at the executor's.

The rapid introduction of scientific developments on the routes will help to intensify the production and economic activities of the main administration's subdivisions as well as shorten the time for completing the state projects.

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EQUIPMENT FOR BALLASTING, REINFORCING PIPELINES ANALYZED

Moscow STROITEL'STVO TRUDOPROVODOV in Russian No 10, Oct 84 pp 17-18

[Article by V. A. Shukayev of the Severtruboprovodstroy Trust and N. P. Vasil'yev, V. Ye. Polyakov, N. V. Poprykina and Ye. L. Fal'kovskaya of the VNIIST: "A Technical and Economic Analysis of Pipeline Reinforcing and Ballasting Equipment"]

[Text] In building the oil and gas main lines in the regions of Western Siberia and the North of the European USSR, a large amount of equipment is employed for the ballasting and reinforcing of the pipelines on the plan levels. This is due to the significant length of the lines which run over waterlogged and swampy terrain. The length of sections where ballasting and reinforcing of the pipelines are required just in Western Siberia is 20-25 percent of the total length of the lines. Each year the organizations of the Minneftegazstroy [Ministry of Construction of Petroleum and Gas Industry Enterprises] annually utilize more than 1 million m^3 of reinforced concrete for ballasting the pipelines.

The creation of a large amount of different elements of reinforced concrete weights and anchors and the greater amount of work in ballasting and reinforcing the pipelines have required the carrying out of technical and economic analysis of their employment, the discovery of the most rational structural elements and the search for ways to reduce material intensiveness.

VNIIST [All-Union Scientific Research Institute for the Construction of Large-Diameter Pipelines] and the Trust Severtruboprovodstroy [Northern Pipeline Construction], on the basis of the technical and economic analysis of 19 structural elements and methods of ballasting and reinforcing the pipelines, have worked out the "Proposals to Ensure Longitudinal Stability of Large-Diameter Pipelines."

The technical and organizational solutions, in accord with the requirements of the "Instructions on Determining the Economic Effectiveness of Utilizing New Equipment, Inventions and Innovations Proposals in Construction" (Construction Standard 509-78) of the USSR Gosstroy were compared using base-adjusted expenditures.

In the course of the analysis we employed the current standards, price lists, rates, the results of scientific research and production experience.

The correctness of the results from the technical and economic analysis depends directly upon the reliability of the initial data describing the structural element or the method of pipeline ballasting and reinforcing. Here the basic characteristics are the ballasting or retaining capacity and the consumption of materials. The analysis did not take into account any means for ballasting and reinforcing the pipelines for which one of the above-listed characteristics was lacking.

As the basic provisions the following were adopted: the length of hauling the mineral dirt should not exceed 10 km, the distance from the plant manufacturing the reinforced concrete weights to the destination station should not be more than 4,000 km and 50 km from the destination stations to the places of ballasting and reinforcing the pipelines.

The analysis was made for the first territorial area in the ballasting and reinforcing of 1,420 mm-diameter pipelines on straight sections.

For the equipment for ballasting and reinforcing the pipelines, two areas of use were adopted into which all the structural elements and methods provided in the technical-economic analysis were distributed, as follows:

The first area--a swamp to 2.5 m deep, areas of terrain waterlogged or periodically flooded with water;

The second area--swamp 2.5 and more m deep, areas with the possibility of the frost buckling of the ground.

The results of the technical and economic analysis are given in Tables 1 and 2.

It was discovered that the most rational for the first area of use was the ballasting with shift-in mineral ground delivered to the section of the line from quarries by dump trucks. Here the ballasting ability of the ground was determined proceeding from the parabolic law of its distribution above the pipeline. Thus, for pipelines with a diameter of 1,420 mm, the necessary height of the dirt fill was 1.5 m and for the pipelines with a diameter of 1,220 and 1,020 mm, respectively, 1.3 and 1.1 m. Here the density of the dirt in water was considered equal to 0.9 tons per m^3. The basic portion of labor intensiveness for this type of ballasting occurred in excavating the dirt in the quarries and delivering it to the line.

Using dirt for ballasting from the trench debris and subsequently used as fill on non-woven synthetic material which is laid on top of the pipeline is 40 percent more expensive than the previous method, basically due to the cost of the material. Of the four examined anchor designs, the minimum base-reduced expenditures occurred for the screw-in anchors. For all the remaining types of anchors, these indicators were virtually the same.

An analysis of the structure of the base-reduced expenditures on reinforcing the pipelines by anchor devices showed that materials are responsible for from 85 percent (the screw-in anchor devices or VAU) to 93 percent (the expanding anchors or AR-401) of the base-reduced expenditures. Here for anchors with a smaller share of material costs the base-reduced expenditures for installation

Table 1

Structure of Base-Calculated Expenditures on Ballasting and Reinforcing 1 km of Pipeline, Rubles

a) Конструкции, анкеров и утяжелителей	b) Прямые затраты	c) В том числе: d) материалы	e) установка на трубу	Накладные расходы f)	Себестоимость g)	Капитальные вложения h)	Приведенные затраты i)
j) Первая область применения							
k) Анкеры:							
l) Винтовой	14 319	12 852	1460	488	14 800	1994	17 100
m) Г-образный	20 987	19 980	1007	566	21 543	1477	21 765
n) Система Г-образных	17 124	15 722	1402	590	17 714	2346	18 063
o) Раскрывающегося типа АР 401	31 102	29 700	1402	590	31 692	2346	32 042
p) Утяжелители							
q) Седловидный	55 506	54 863	643	482	55 988	2132	65 310
r) Грейферного типа	73 416	72 798	618	457	73 873	2496	74 247
s) УБК	59 093	58 628	465	347	59 440	2132	59 761
t) Типа «струна»	72 528	71 572	956	711	73 239	2496	73 560
u) Концентрического типа	32 158	29 659	2499	1166	33 324	2237	33 659
v) Закрепленный грунт**	8 484	5 506	2978	3555	12 039	2932	12 478
w) Нетканый синтетический материал (НСМ)*	16 327	16 300	27	93	16 420	—	16 420
x) Грунт из карьеров	7 440	—	7440	2861	10 301	8299	11 543
y) Вторая область применения							
z) Охватывающего типа УБО	52 833	52 046	787	643	53 476	2496	53 848
aa) То же, с гарантированным объемом грунта	34 936	33 836	1100	644	35 580	2305	35 954
bb) УБО из доменных шлаков	50 523	49 875	647	529	51 052	2053	51 358
cc) УСС	64 947	64 423	524	398	65 345	2132	65 667
dd) СГ	84 778	84 135	643	482	85 260	2132	85 581
ee) Геликоидного типа	58 822	58 061	761	558	59 380	2496	59 753
ff) Полимерно-контейнерные балластирующие устройства (ПКБУ)**	60 600	60 099	501	405	61 005	801	61 125

*Base-reduced expenditures were determined considering use of the trench dirt.

**The base-reduced expenditures were determined by data of the authors of the design and will be adjusted in the process of experimental introduction.

Key:

a--Structural elements, anchors and weights
b--Direct expenditures
c--Including
d--Materials
e--Installation on pipe
f--Overhead
g--Costs
h--Capital investment
i--Base-calculated expenditures
j--First area of use
k--Anchors
l--Screw-in
m--L-shaped
n--System of L-shape
o--Expanding type AR-401
p--Weights
q--Saddle
r--Grapple-type
s--UBK [expansion unknown]
t--"String" type
u--Concentric type
v--Reinforced dirt
w--Nonwoven synthetic material (NSM)
x--Dirt from quarries
y--Second area of use
z--Grab type UBO [expansion unknown]
aa--Same with guaranteed dirt volume
bb--UBO from blast furnace slag
cc--USS [expansion unknown]
dd--SG [expansion unknown]
ee--Helicoid type
ff--Polymer container ballasting devices (PKBU)

Table 2

Labor Expenditures on Ballasting and Reinforcing Pipeline

a) Конструкции анкеров и утяжелителей	b) Единица измерения	c) На единицу измерения		f) На 1 км трубопровода	
		d) чел.-ч	e) чел.-дни	d) чел.-ч	e) чел.-дни
g) **Первая область применения**					
h) **Анкеры**	set				
i) Винтовой	Комплект	0,82	0,1	164,0	21
j) Г-образный	То же	2,31	0,28	231,0	29
k) Система Г-образных	»	4,62	0,56	231,0	29
l) Раскрывающегося типа АР-401	»	4,62	0,56	231,0	29
m) **Утяжелители**					
n) Седловидный	1 м³	0,26	0,033	220,0	87
o) Грейферного типа	1 м³	0,24	0,031	203,0	92
p) УБК	1 м³	0,18	0,024	152,3	80
q) Типа «гирлянда»	1 м³	0,38	0,048	321,0	107
r) Концентрического типа	1 м³	1,428	0,17	499,8	86
s) Закрепленный грунт	100 м³	45,73	5,58	1055,4	128,8
t) Нетканый синтетический материал (НСМ)	1000 м²	4,92	0,6	49,2	9,0
u) Грунт из карьеров	100 м³	17,16	2,09	1253,5	152,7
v) **Вторая область применения**					
w) Охватывающего типа УБО	1 м³	0,37	0,043	313,0	86
x) То же, с гарантированным объемом грунта	1 м³	0,55	0,06	302,5	65
y) УБО из доменных шлаков	1 м³	0,37	0,043	257,5	79
z) УСС	1 м³	0,21	0,027	177,7	68
aa) СГ	1 м³	0,26	0,033	220,0	102
bb) Геликоидного типа	1 м³	0,30	0,038	253,8	83
cc) Полимерно-контейнерные балластирующие устройства (ПКБУ)	Комплект	0,608	0,074	182,4	23
	set				

Key:

a--Design of anchors and weights
b--Unit of measurement
c--Per unit of measurement
d--Man-hours
e--Man-days
f--Per km of pipeline
g--First area of use
h--Anchors
i--Screw-in
j--L-shaped
k--System of L-shaped
l--Expanding type AR-401
m--Weights
n--Saddle
o--Grapple type
p--UBK
q--"String" type
r--Concentric type
s--Reinforced dirt
t--Nonwoven synthetic material (NSM)
u--Quarry dirt
v--Second area of use
w--Grab-type UBO
x--Same with guaranteed dirt volume
y--UBO from blast furnace slag
z--USS
aa--SG
bb--Helicoid type
cc--Polymer-container ballasting devices (PKBU)

are also less. Metal consumption for the VAU is 18.5 tons per km and for the AR-401 and L-shaped anchors, respectively, 40 and 33.3 tons per km.

Of the examined reinforced concrete weights, the least base-calculated expenditures were the concentric-type weight the design of which makes it possible to employ quarry dirt for the ballasting.

In the structure of the base calculated expenditures for the ballasting of pipelines by reinforced concrete weights, the share of material costs is 97-98 percent. The differing amount of base-calculated expenditures for the various reinforced concrete weights is explained basically by the complexity of manufacturing and metal consumption per m^3 of reinforced concrete.

In comparing the anchors and reinforced concrete weights for the first area of use, it must be pointed out that the base-reduced expenditures on ballasting using the reinforced concrete weights are actually 4-fold more than in reinforcing the pipelines with anchors. Labor expenditures are increased, respectively, by 3-fold. This is explained basically by the need to deliver the reinforced concrete weights by motor transport from the unloading station to the line.

For the second area of use, the most economic are weights manufactured from materials with increased density (slag weights). Their use makes it possible to reduce the number of weights required to ballast the pipeline, to increase labor productivity, to reduce material intensiveness of the ballasting and so forth.

The results of the technical and economic analysis indicate that the basic areas for reducing the material intensiveness and cost of ballasting and reinforcing the pipelines are: making the weights from materials which possess a greater density than concrete, developing simple-to-produce weights the design of which makes it possible to employ the trench dirt for increasing the ballastability. In the areas of the line which are in the first area of use, it is essential to more widely introduce anchors with the further improvement in the design of these being carried out on the basis of the screwed-in anchors.

It is essential to revise the requirements of the Construction Standard and Rule II-45-75 on the weight of the single reinforced concrete weights by increasing it.

10272
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PIPELINE CONSTRUCTION

UDC 621.643/553.002.2+658.012.12

MINNEFTEGAZSTROY DIRECTOR OUTLINES CONSTRUCTION IMPROVEMENTS

Moscow STROITEL'STVO TRUBOPROVODOV in Russian No 11, Nov 84 pp 2-4

[Article by A. A. Budagyan, director of the Minneftegazstroy [Ministry of Construction of Petroleum and Gas Industry Enterprises] Main Planning and Economic Administration: "Successfully Executing a Program for Further Improvements in the Planning, Organization and Administration of Construction"]

[Text] The development of capital construction and its transformation into a major industrial sector of the national economy is a subject which receives the constant scrutiny of the Communist Party and the Soviet Government. A massive program of capital construction and renewal of the national economy's fixed capital assets is under way in our country. At the same time, there are quite a few unresolved problems in capital construction, as was mentioned in the decisions of the 26th CPSU Congress and in subsequent CPSU Central Committee plenums. Plans for putting capacities and facilities into operation are not being fulfilled, and the construction time spent on a number of enterprises and projects is extending well past the norm. There are still deficiencies in planning, in the business of designing and estimates, and in the organization and administration of capital construction. There has been a diminution in the responsibility of the purchasing ministries and their associations and enterprises, and also of the construction ministries in fulfilling their assignments with regard to putting capacities and projects into operation, to the effective utilization of capital investments and to improving the financial and economic indicators in construction. The scattering of capital investments among numerous construction projects is being permitted, above-normal volumes of unfinished construction are still great in a number of sectors, and the range of efforts for the reconstruction and technical re-equipping of production is inadequate. Basic methods for eliminating the above-mentioned faults have been set forth in the decree of the CPSU Central Committee and the USSR Council of Ministers entitled "Improving the Planning, Organization and Administration of Capital Construction". The decree was directed primarily at the completion of the plan assignments for putting production capacities and projects into operation by all the enterprises and organizations, and also at the completion of housing, children's pre-school institutions and social, cultural and domestic facilities. The tasks are set: to improve production efficiency in the construction trades; to reduce the time spent in, and improve the quality of, construction; to fulfill assignments in regard to profit and the reduction of the production cost of construction and

installation operations by improving the organizational structure of the construction administration, by enlarging the construction and installation organizations and enterprises of the construction industry, and by continuing to develop industrial methods; and lastly, to introduce progressive planning solutions. Labor productivity in construction must increase significantly. This can be promoted by a variety of things, including by the elimination of work-time losses and eliminating violations of labor and production discipline, by increasing self-discipline and exactingness, and developing the brigade contract, organizing a permanent and skilled work-force, by improving working and living conditions for the employees of construction organizations and enterprises of the construction industry, and also by increasing the role of labor collectives in fulfilling the assigned tasks.

The CPSU Central Committee and the government of the USSR consider the diversion of construction and installation organizations, materials and equipment away from projects incorporated in the State Plan to non-Plan construction to be intolerable. An examination of such facts as the violation of state and party discipline has been proposed, as well as making workers who are guilty in these affairs strictly answerable. One of the important problems is the striking of a balance of the plans for construction and installation operations with the financial and material-technical resources, and the output of the construction and installation organizations. This question is accorded great importance in the decree.

The CPSU Central Committee and the USSR Council of Ministers have called for the completion, in all conditions from the beginning of the year, of all construction jobs which were started this year, and which will have been started next year,by using existing resources. This work is to be done using the labor force, the materials and the equipment and transport needed to insure that the schedules for construction and the assignments for putting capacities and facilities into operation are met. They have also demanded that construction and installation work not be done without plans for the organization of construction and plans for the production of work.

In the decree, the ministries and departments were instructed to distribute the material and technical resources among the sub-departmental construction organizations and construction projects, keeping within the limits of the funds allocated to them according to the norms approved by USSR Gosplan and USSR Gosstroy for one million rubles' worth of SMR [construction and installation operations]. This distribution is to be based on needs determined by plans and estimates. USSR Gossnab regional agencies are making batch deliveries of these construction job resources according to the products lists and the assortments, and in accordance with the contracts and orders. They are also taking construction and installation work schedules into consideration.

This situation is of paramount importance. Being guided by it, it is necessary locally, and in the central Minneftegazstroy [Ministry of Construction of Petroleum and Gas Industry Enterprises] machinery, to accomplish a great deal of work. In the first place, the industry's main administrations must make vehement demands for the timely submission of plans and estimates from clients,

In the second place, a reworking of the activity of our main supply administrations is called for. This is a totally new situation for this supply administration and should be approached without delay. The resources are to be allocated, not for a million rubles' worth of construction and installation work, but for plans and estimates--and this is to be based on the work production schedule. The Main Technical Administration and NIPIorgneftegazstroy [possibly State Scientific Research and Planning Institute for Organization of Petroleum and Gas Industry Construction] need to complete their calculations on the capacities of the industry's organizations. GlavPEU [Main Planning and Economic Administration] and GlavPRU [possibly Main Planning and Distribution Administration] and the Financial Administration should severely scrutinize the construction plans of the administrations and associations, to make sure a balance can be struck among them.

At present, all the ministry's organizations are involved in developing a draft for the 1985 plan. It is of utmost importance right now, taking our guidance from the decree, to increase the exactingness toward the clients with regard to their certain provision of the complete planning-estimating documentation for proposed projects. When new projects are being proposed, the manner in which existing structures are used must be strictly observed, as the decree directly requires that, when setting limits for capital investments, we must proceed on the basis of the need to plan operating production and new construction as a unified whole, and must provide for the allocation of capital investments for growth in the planned increase of output production volume. This concerns the industry's own construction to an equal degree.

It has been suggested to the ministries and purchasing departments that, prior to 1 April 1985, they re-examine and define more precisely their planning and estimating documentation on construction jobs which will last over into the 12th Five-Year Plan period, in order to guarantee a high technical level for the enterprises and to exclude any sort of surplus from the plans and estimates, and also in order to exclude projects from the plans and estimates, the erection of which is either not critically necessary, or can be postponed until later dates, thereby reducing the estimated cost of their construction.

We know that occasionally, many projects are included in construction project plans (especially in plans for large mains), which are not required for them. The main ministry administrations, the associations, trusts and also the Sectorial Administrations for the Petroleum and Gas Industry should take an extremely active part in this work and should send their suggestions concerning the exclusion of revealed surpluses from plans and estimates to the customers. The sectorial administrations should correlate all the suggestions from the main administrations and associations no later than the end of the year and prepare them for the corresponding purchasing mini ries.

It was decided to complete the transition to continuous two-year planning for housing and social and domestic-purpose facilities in 1985.

The CPSU Central Committee and the Soviet Government have taken suggestions from a number of ministries, including Minneftegazstroy, on picking out construction and installation subdivisions and construction industry enterprises

which were exemplary in their use of new equipment, advanced manufacturing methods, fully mechanized construction, and in their economy of material resources, in providing high labor productivity and efficiency, high quality work and their application of advanced domestic and foreign experience. In its list of exemplary organizations, the ministry planned to include the Sibkomplektmontazh [possibly Siberian Assembly Installation Association], and the following trusts: Severtruboprovodstroy [Northern Pipeline Construction], Surgutneftepromstroy [Surgut Petroleum Industry Construction], Kuybyshevtruboprovodstroy [Kuybyshev Pipeline Construction], the Novosineglazovskiy and the Serpukhovskiy construction design combines, and the Novokuybyshev Insulation Materials Plant.

The situation which has come about in the last few years, in which many general-contracting construction and installation trusts have divested themselves of the responsibility for insuring that enterprises, buildings and structures are put into operation within established deadlines, and in which they unsatisfactorily coordinate the functions of construction, has been acknowledged as wrong. It has been determined that the construction-installation trust [a construction-installation production association or other organization equal to a trust] should be the basic cost accounting unit in the administration of the construction industry. Trust directors bear the responsibility for putting production capacities and projects into operation on time, for completing construction and installation work in accordance with the integrated schedules which have been developed and approved, for completing assignments for increasing labor productivity and profits, for lowering production costs for construction and installation jobs and for observing other technical and economic indicators.

The trust's general contractor has to coordinate the activities of everyone taking part in a given construction job, and his decisions on problems connected with realizing approved work plans and schedules are binding for everyone involved in the job, regardless of their departmental subordination.

In accordance with the decree under consideration, and according to the schedule which has been developed, the ministry has to approve the structure of each trust, bearing in mind that construction and installation administrations UPTK's [possibly Production and Equipment Procurement Administrations] and other subdivisions, depending on the specific nature of the job being done by the trust, should, as a rule, become part of the operation, acting as production units. The trust must be provided with the necessary mechanization and transport equipment by being equipped therewith by the trust's own subdivisions, or by appointing this task outside the trust to prompt production subdivisions of special-purpose transport and mechanization organizations which are subordinated to the trust, and which are part of the ministry and main regional construction administrations.

Let us turn our attention to the UPTK. It is not a question of the general inclusion of these organization in the trust, but a question of solving the problems which are dependent on the sort of work they do. Everything has to be done in accordance with the established number of AUP [administrative personnel] and the limited allocations for its upkeep.

Regulating and strengthening the structure of the trusts is critically important. As we know, this is the basis for finalizing the development of the general scheme for administering the industry.

Meanwhile, there are still many minor organizations and organizations which are planned to operate at a loss in the industry. These petty, insufficiently profitable, and at the same time, operating construction organizations should be amalgamated and strengthened. A thorough, precise definition of the areas of activity with regard to their specializations and workload for the future is needed.

At the present time, 130 construction and installation trusts (and organizations equal to them) including 792 SU's [construction administrations] and PMK's [mobile mechanized columns], 26 KTP's [integrated production lines] and 54 cost-accounting sections, have been organized within the main administrations and associations. In spite of the fact that more than 85 percent of the trusts and SU's belong to the first wage group, 31 trusts, using their own labor forces, complete jobs valued at less than R15 million and 93 SU's do less than two million rubles' worth of work. Analysis shows that these are as a rule, unprofitable organizations.

The situation cannot be considered normal, when, from 792 construction and installation administrations and mobile mechanized columns, 277 (or 35 percent) of them are subsidized, and when, in 1983 these organizations, with a plan [figure illegible] million, showed actual financial losses of R153 million.

There are more than the usual number of planned-unprofitability, or subsidized, organizations in Glavkomigazneftestroy [Main Komi Gas and Oil Industry Construction Administration] (17 of the 27 main administration organizations), Glavukrneftegazstroy [Main Ukrainian Gas and Oil Industry Construction Administration] (18 out of 27), Tatneftestroy [Main Tatar Gas and Oil Industry Construction Administration] (37 out of 50), and the Glavneftegazstroy [Main Oil and Gas Industry Administration] (42 of 89). Actual losses for these subdivisions surpassed the planned amounts by, respectively, 1.2; 4.0; 0.7 and 6.8 million rubles. In Glavyuzhtruboprovodstroy [Main Southern Pipeline Construction Administration], 19 out of 39 of the organizations are subsidized.

Administrators of the above enumerated, and certain other organizations, should immediately take practical measures to eliminate unprofitable subdivisions, as required by the decree, by consolidating and reducing overhead expenses and by increasing labor productivity.

Using their own work forces, less than two million rubles is realized by 40 percent of the organizations of Tatneftestroy [Tatar Petroleum Industry Construction Association] and Glavneftegazstroy, by one-third of Soyuzgazpromstroy [All-Union Gas Industry Construction] Association organizations and by 25 percent of the organizations of Glavyuzhtruboprovodstroy.

It is not surprising that right in these main administrations, administrations and associations they are tolerating the largest overexpenditures of maximum allocations for maintenance of control devices and, something which is absolutely intolerable, the exceeding growth in the number of AUP [management personnel] in comparison to the increase in the number of employees overall. Thus, in 1983, in comparison with 1980, the increase in management personnel amounted to 19.7 percent in the Tatneftestroy Association, at an overall increase in the work force of 12.3 percent. Of 125 organizations,53 of them, or 42.4 percent, allowed an overexpenditure of maximum permissible allocations. The number of management personnel in Glavneftegazstroy increased by 18.7 percent, at an increase of 10.3 percent for the number of employees overall. Out of 202 organizations, 84 of them, or 41.6 percent overexpended their maximum permissible allocations. Management personnel increased by 23.7 percent in Glavvostoktruboprovodstroy [Main Eastern Pipeline Construction Administration], at an overall increase in employee numbers of 17.9 percent. Of its 148 organizations, 76 of them, or 51 percent, permitted overexpenditures of their maximum permissible allocations.

Facts like these also exist in certain other organizations. In this connection, one more problem requires scrutiny.

Expenditures for departmental communications and for leasing communication channels have undergone unusually great increases in the last few years. If, in 1981, these outlays amounted to R15.4 million, then they had already grown to R25.2 million in 1983. They increased by almost 2-fold in Glavsibtruboprovodstroy and Glavtyumentruboprovodstroy, and by almost 3-fold in Glavvostoktruboprovodstroy. Analysis shows that one of the causes for the increase in expenditures for communications is the uncontrollability in the acquisition and putting into operation of departmental communications equipment, and the leasing of communications channels which are paid for 24 hours per day.

The ministry has examined and adopted a resolution which calls for a sharp cutback in non-productive expenditures for these purposes, and local organizations should keep strictly to the established limits. The directors of main administrations, associations and especially trusts, who so easily sign agreements with communications enterprises, must analyze the state of affairs with extreme thoroughness, and unconditionally eliminate these excesses.

The industry's bringing in of management in accordance with the fundamental tenets of the CPSU Central Committee and the USSR Council of Ministers' decree calls for the completion of a large volume of organizational work in a short time by the ministry staffs, main administrations and associations. The previously-developed draft for a general plan for management has to be corrected at all its structural links, on the basis of the necessity for a further increase in management efficiency and a considerable reduction in outlays for maintenance of its personnel. As for the dividing of the construction ministries' work into districts, the decree provides for a bringing of order to the construction administration structure, bearing in mind that in the oblasts, krays, autonomous republics and union republics (which are not divided into oblasts), construction should be carried out, as a rule, by organizations from

a single construction-industry-wide ministry, which is charged with doing work for all clients of a given region (excluding jobs given to a special-purpose ministry), and that the work of the main regional construction administrations can extend, depending on the volume of work, into one, or several, oblasts. We need to be guided closely by this statute when considering orders for construction, especially for facilities not connected with the increase in the recovery or transport of oil and gas, or the special nature of our industry.

In the five-year and yearly plans, assignments for putting production capacities into operation with deadlines approved by the general contractor will be confirmed by Minmontazhspetsstroy [Ministry of Installation and Special Construction Work]. The work and assignments executed by Minmontazhspetsstroy organizations will be taken into consideration during the evaluation of their work and economic incentive.

It has also been acknowledged as necessary to increase considerably the responsibility of clients for a radical improvement in the state of affairs in capital construction and for a major raising of the level of effectiveness in utilizing capital investments; for the fulfilling, within established deadlines, of assignments for putting capacities, facilities and fixed capital into operation and for putting production capacities, which have only recently been made operable, into operation within set deadlines. Implementation of these assignments must be taken into consideration when bonuses are being paid to supervisory employees of enterprises and purchasing organizations.

A number of the decree's statutes are directed at improving the financing of construction. In particular, it has been proposed that USSR Stroybank [Bank for Financing Capital Investments] and USSR Gosbank [State Bank] make credit available at an interest rate which has been reduced by half, to construction organizations which successfully complete assignments for putting capacities and facilities into operation, and that they make uninterrupted financing available for production-oriented construction projects, within the limits of their estimated value and during their set periods of construction. Provision has been made for financing production-oriented construction projects which are slated to be put into operation this or next year, within the limits of their yearly allocation. The granting of credit to construction projects, associations and organizations for expenditures connected with completion of work close to deadlines for putting capacities, facilities and fixed capital into operation, and in cases of overfulfillment of yearly plans, has also been provided for. It has also been proposed that USSR Stroybank and USSR Gosbank make long-term (with a deadline of up to three years) credit available to contract construction and installation organizations, to be used to institute organizational and technical measures which exceed the limits for state capital investments, and which would economize on material resources and the mechanization of labor. It has also been suggested that credit,(other than credit to cover expenses for incomplete execution of construction and installation work), granted to contracting organizations which tolerate violations of state planning discipline, including such violations as losses of in-house floating capital, be limited. When construction and installation organizations are

found to be unprofitable, proposals directed at increasing the profitability of these organizations should be submitted to the USSR ministries and departments and the union republican councils of ministers.

Prior to 1 January 1985, the USSR Ministry of Finances, USSR Stroybank, USSR Gosbank and USSR Gosplan will submit proposals on further increasing client responsibility for continuous financing of construction.

The decree obliges USSR Gosplan, USSR ministries and departments and union republic councils of ministers, as they work up plans for capital construction, to balance the limits of capital investments and construction-installation jobs with the financial and material-technical resources, and with the construction and installation organizations' capacities, so that the construction of enterprises and facilities is carried out in accordance with standards for duration of construction time. They are also charged with reducing the number of projects under construction at any one time, with the intention of bringing all uncompleted construction up to established levels in the next 3-4 years.

It needs to be mentioned that, for Minneftegazstroy as a whole, the number of production-oriented construction projects was reduced from 2,345 in 1981 to 2,103 in 1984. At the same time, the number of newly started construction projects was increased from 587 to 709 during the same period.

According to Mingazprom and Minneftеprom, the overall number of construction projects in 1983 was 283 and 1,432 respectively, and in 1984 the totals were 218 and 1,379. Newly initiated projects increased respectively from 37 to 68, and from 412 to 454 for those two years. According to Minneftegazstroy, in 1983 the overall number of construction projects amounted to 142, this being reduced in 1984 to 113. The number of new starts for those years was, respectively, 24 increasing to 35. The number of new starts in construction for other ministries and departments underwent an unusually large increase. The overall number of construction projects was reduced by almost 25 percent, but the number of new starts increased from 94 to 132. These data bear witness to the fact that control of reduction in the number of facilities being simultaneously constructed is still inadequate, locally as well as in the central organization. Naturally, this also leads to a scattering of extant resources, and in the end to a protraction of construction periods. Meanwhile, the efforts of all collectives must be directed toward the unconditional fulfillment of plan assignments for putting production capacities and facilities, including social and domestic facilities, into production, which is also called for by the decree set by the CPSU Central Committee and the USSR Council of Ministers, entitled "Improving the Planning, Organization and Administration of Capital Construction".

Realization of the program proposed in the decree will raise the planning, organization and administration of capital construction to a new, higher stage. The additional measures which, in accordance with the new requirements, need to be taken in order to improve affairs in oil and gas construction, will contribute to further improving the economic mechanism within the industry, and will permit the efficiency of its activities to be improved considerably.

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IMPORTANCE OF LABOR PRODUCTIVITY INDICATOR CITED

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[Article by L. M. Chernyak, of Minneftegazstroy: "Achieving Planned Labor Productivity Is the Task of Every Organization" under the rubric "Decisions of the 26th CPSU Congress in Practice"]

[Text] To insure the effective utilization of natural, material and labor resources as the decisive and most effective means of augmenting the country's national wealth, and augmenting the rapid growth of socialist accumulations and consumer resources; to accord particular attention to raising labor productivity, increasing the yield of fixed capital in all sectors of the national economy and reducing the material-intensiveness of production.

From "Basic Directions for the Economic and Social Development of the USSR for 1981-1985, and for the period up to 1990".

Labor productivity is one of the most important indicators of the economic growth of the national economy, of industry and of an individual organization. In construction, this indicator allows the commensuration of produced output--the volume of construction and installation work which has been completed--with labor expenditures. The plan for labor, within which the further development of productive forces (scientific and technical progress, increasing electric and mechanical power availability per man, improvement in workers' skills etc.) are reflected, is based on the indicators for labor productivity and the numerical strength of employees.

Determination of labor productivity by using a value indicator is brought about through the need for commensurability of the levels of output when producing either dissimilar or identical output, but within the changing manufacturing conditions. This indicator makes it possible to correlate the data for different forms of construction and installation work, and to carry out uniform planning and calculation of labor production in all links of the construction industry.

Not only are high growth rates for work volumes and for putting facilities and capacities into operation characteristic for growth in oil and gas construc-

tion during the current five-year plan period, but positive economic indicators are, too, and in first place, this growth is being brought about through increased labor productivity. From 1981 to 1983 output in the construction industry increased by 21.1 percent against a five-year plan assignment of 18 percent, and an 11.2 percent total increase for the yearly plans. The increase in the growth rate for output which has been achieved since the beginning of the five-year plan period has also surpassed the corresponding indicator for the 10th Five-Year Plan (17.4 percent).

Analysis of the influence various factors have on increasing labor productivity has shown that an increase in output of about 40 percent is achieved through mechanization and automation of production processes and the introduction of advanced tecnology. The group of factors which apply to improving the organization of labor and the administration of construction are approximately as important as the above-mentioned factors. And finally, about 20 percent of the total increase in labor productivity has come about through industrialization of construction and widespread utilization of progressive designs, products and materials.

The greatest growth in labor productivity since the beginning of the five-year plan has been achieved by Glavvostoktruboprovodstroy [Main Eastern Pipeline Construction Administration] (121.1 percent), the Soyuzpodvodtruboprovodstroy [All-Union Underwater Pipeline Construction] Association (119.4 percent) and Glavsibtruboprovodstroy [Main Siberian Pipeline Construction Administration] with an increase of 114.5 percent. Among the organizations which carry out surface construction, good results have been obtained by Glavzapsibzhilstroy [Main Western Siberian Housing Construction Administration] (118.2 percent) and the Sibkomplektmontazh [possibly Siberian Unitized Assembly] Association (109.6 percent). Considerable effort has been made in these subdivisions to implement the achievements of scientific and technical progress, and advanced methods of organizing labor, production and administration.

However, a number of subdivisions not only provided no increase in labor productivity during three years of the five-year plan period, but also concluded 1983 with an output indicator which was lower than the base indicator for 1980. These are: Glavtyumentruboprovodstroy [Main Tyumen Pipeline Construction Administration](whose output fell off by 14.7 percent), the Tatneftestroy [possibly Tatar Petroleum Industry Construction] Association (by 5.3 percent), Glavurengoygazstroy [Main Urengoy Gas Industry Construction Administration] (by 4.9 percent) and Glavtyumenneftegazstroy (by 1.3 percent). For three years of the five-year plan, there was practically no increase in output from Glavkomigazneftestroy [Main Komi Gas and Oil Industry Construction Administration], Turkmenneftestroy [Turkmen Petroleum Industry Construction Administration] and Glavneftegazelektrospetsstroy [Main Oil and Gas Special Electric Construction Administration].

Sector collectives are carrying out construction of a wide range of projects, using large-size elements, assemblies, panels and blocks, with fully prefabricated module construction for the supporting and enclosing of the structures. There has been an increase in volumes of large-panel housing construction, and wide use has been made of the unitized-modular construction method. By the

end of the third year of the 11th five-year Plan, the extent of use of efficient structural shapes for rolled metal stock in the manufacture of structural steel structures increased by 2- percent, and use of sheet wide-shelf [universal] rolled stock has doubled. In 1983, 30 devices for plasma-treating materials were installed, and 6500 m^3 of structures and articles were manufactured, using superplasticizers, in the plants. By and large, the state plan assignments for the introduction of new equipment were fulfilled through a 11%-percent reduction in the number of workers. At the same time, two of the plan's items were not fulfilled: adoption of light-weight, improved-quality gypsum drywall panels for construction of industrial partitions in residential, public and production buildings (according to the plan, 2000 m^2 were to be used, but in fact, only 1,580 m^2 were used), and the use of efficient double-glass plastic window sashes (the plan called for 40,000 m^2, but only 24,900 m^2 were used). Considerable underfulfillment of state plan assignments was permitted by Glavneftegazstroy, Glavzapsibneftestroy, Turkmenneftegazstroy [Turkmen Oil and Gas Construction Association] and Soyuzgazpromstroy [All-Union Gas Industry Construction Association]. Moreover, assignments which had been determined for a number of items connected with the use of new materials and designs, and brigade forms of labor organization were not fulfilled by these main administrations and associations.

In the first half of 1984, many subdivisions fulfilled plans for increased labor productivity. In the second quarter, there was an increase in the number of organizations realizing output assignments.

Upcoming planning the labor collectives hold a special place in the fulfillment of this extremely important economic indicator during this year. The initiative of many of the sector's leading organizations and enterprises is directed toward the unconditional realization of the tasks set by the party: to obtain an above-plan increase in labor productivity of one percent, and to reduce the prime cost of production by an additional 0.5 percent.

In order to improve upcoming planning efforts, the ministry developed the "Sectoral Recommendations on Acceptance of Counter-Plans for Increasing Labor Productivity and Reducing Production Costs in Minneftegazstroy for 1984", which the ministry approved in conjunction with the Central Committee Presidium of Oil and Gas Industry Workers.

Prior to 1984, counter-plans for increasing labor productivity and reducing production costs for construction were not used. This has been explained, on the one hand, by the limitation in the volumes of contract construction and installation jobs, and on the other hand by the absence of corresponding sectoral methods. Now, just such methods have been developed and approved.

The fundamental difference in the counter-plans from socialist obligations should be pointed out. Counter-plans are based on detailed calculations for reducing the number of workers through measures for new equipment, advanced technology and the scientific organization of labor. Upon acceptance of a counter-plan, a construction organization has to make an accurate determination of the volume of construction and installation jobs, as much for the year

as for the quarter and calculate the work-force reduction in order to insure a one percent increase in labor productivity. Provision has been made for keeping a strict balance between counter-plans and the remaining planning indicators. Counter-plans which are used toward yearly plans, and which exceed the five-year plan assigments, are stimulated from the FMP [Material Incentive Fund] in accordance with fund-generated quotas which have been increased 3-fold. If the counter-plans are lower than the five-year plan indicator, additional deductions in the FMP are made in accordance with the plan standard, and are increased 1.5-fold.

A multiple sequence of acceptance and registration of counter-plans was developed in the sectoral recommendations on the level of brigades, SU's [construction administrations], trusts and main administrations, and necessary planning and accounting forms, and examples of how to calculate examples of additional deductions in the material incentive fund etc. were also given.

The recommendations to include measures which insure the fulfillment of counter-plans, and for the introduction into the plans of new equipment and advanced manufacturing methods, are considered to be important. This makes it possible to provide an incentive for the realization of plans for increasing labor productivity via means, among which is new equipment.

All main administrations, associations, and the overwhelming majority of trusts and SMU's [construction and installation administrations] have developed additional measures for introducing new equipment, advanced manufacturing procedures, and improvements in labor, production and administration for 1984, and on this basis, they approved the counter-plans for increasing productivity. During the first half of 1984 labor productivity in construction increased by 4.5 percent, at a planned increase of 3.4 percent (and based on the counter-plan increase of 4.4 percent). Nine of the main administrations successfully fulfilled both their basic plans and their counter-plans. The Soyuzpodvodtruboprovodstroy Association and the Turkmenneftegazstroy Association both fulfilled their basic plans, but underfulfilled their counter-plan assignments. Glavsredazneftegazstroy [Main Central Asian Oil and Gas Industry Construction Administration], Glavtyumentruboprovodstroy, Glavkomigazneftestroy, Glavneftegazstroy, and the Tatneftestroy Association all had unsatisfactory output indicators. The main reason for the non-fulfillment of assignments for increasing labor productivity in these subdivisions is that they were poorly organized regarding the introduction of new equipment, advanced procedures, industrialization, and regarding measures for improving labor and administration. In many trusts, assignments for integrated automation and mechanization are not provided, output norms for construction equipment are not met, and their availability is low as well, and unproductive losses of work time are great.

Out of six trusts in Glavtyumentruboprovodstroy, four did not manage planned output for the first half year. It should be said that the 1984 plan for the introduction of new equipment was not coordinated with the labor plan according to the indicator for the conditional release of the work force. In the organizations of the main administration, the brigade contract is being poorly implemented, existing brigades are few, and have an insufficient complement of skilled engineering and technical workers.

In the Samotlorneftepromstroy [Samotlor Petroleum Industry Construction] and Megiongazstroy [Megion Gas Industry Construction] Trusts, both of Glavtyumenneftegazstroy Administration, they failed to fulfill their plan for the introduction of new equipment and advanced procedures used in the production of construction and installation operations using a brigade contract, for large-panel and prefabricated housing construction etc. Indeed, it is for these very reasons that both of these trusts failed to manage their plan assignments for increased labor productivity, and the counter-plans adopted by the collectives for the first half of 1984.

The scheduled plan for a wage fund, which is closely connected with planned regulation of the amounts and the increase of the average wage for all categories of workers, permits the most important social and economic problems to be resolved, i.e., improvement in the well-being of the workers, distribution of labor resources around the regions and spheres of activity, improvement of workers' skills, development of material incentives etc.

As far back as 60 years ago, in 1924, the RKP(B) [Russian Communist Party (Bolsheviks)] Central Committee Plenum adopted a special decree on wage policy in which it was pointed out that the growth of labor productivity must overtake the growth rate for wages. This party directive is still in force today. The factors for increased labor productivity for workers also has an effect on the average wage. In accordance with the classification adopted in the ministry, the factors for growth of labor productivity are brought together into three basic groups: mechanization and automation of production processes; the introduction of advanced procedures; industrialization of construction and the use of new construction designs, products, materials and installation procurements; and finally, the improvement of the organization of labor, production and administration.

An increase of the median wage of one percent of the increase in labor productivity, as a result of the factors of technical progress, amounts to 0.1-0.15 percent.

Improvement in the organization of labor, production and administration also involves an increase in the growth of the median wage. According to preliminary calculations, for a one percent increase, labor productivity in this case comes out to 0.6-0.7 percent of the increase in the median wage. Taking the relative share of various factors in the overall growth of labor productivity into account, an overall increase of the median wage of one percent of the increase of labor productivity should amount to 0.2-0.3 percent.

The above requirement, however, is far from being met in all the sector's construction organizations. Thus, in the first half of 1984, in 14 subdivisions of the middle control link, the growth rate of the median wage (with no material incentive fund) surpassed the growth rates for labor productivity. Here, in six subdivisions (including Glavsredazneftegazstroy, Glavtyumentruboprovodstroy, Glavkomigazneftestroy et al) the median wage increased in comparison to the first half of 1983, but labor productivity decreased. Cases of the increase of labor productivity surpassing the median wage increase were noted in only nine administrations and associations.

Accounting data and materials from checks which were conducted by the Center for the Scientific Organization of Labor, and which were confirmed by USSR Stroybank, attest to the fact that in a number of organizations, elimination of surpluses in the expenditure of wage funds is proceeding slowly, there is an absence of technical and economic calculations, and of grounds for labor indicators, and plans for financing construction are not being developed. Among the causes for the overexpenditure of the wage fund are: increased volumes of completed construction work, outlays for the rectification of defective output and remodeling, violations in the organization of norm setting and wages, maintenance of engineering and technical workers and service personnel through a workers' wage fund, etc.

Practice shows that the so-called unaccounted-for factors have a considerable effect on actual construction output. For instance, the changes in the sectoral and regional structures of construction and installation operations, the budget for work time, in the work volumes on start-up facilities, in the extent of losses of work time and non-productive outlays within the labor shift, in the skilled staff of workers' organizations etc. The effect of each of the ennumerated factors on the level of labor productivity is determined by accounting data or by calculations done on the basis of statistical or bookkeeping accounts, and from data produced by the work-day "photograph" method, and by other calculating and accounting documentation.

A great number of main administrations and associations are not fulfilling the assignments set by the ministry for the introduction of the lump wage payment system. This system exerts a positive effect on the increase of the median wage, and, at the same time, promotes vigorous growth in labor productivity thanks to the fact that it preserves the needed correlation in their growth rates. Practice shows that the labor productivity of brigades which work on contracts which pay for work by the job is increased by 15-20 percent, with a concomitant increase in wages of 10-12 percent.

For the ministry as a whole, the share of funds for lump wage payments, within the wage fund for pieceworkers , comprised 54 percent against a plan figure of 67 percent for 1983. The indicators for implementation of the lump wage payment system in Glavzapsibshilstroy (42.7 percent), Glavkomigazneftestroy (44.1 percent) and Glavsibtruboprovodstroy (44.6 percent) are below the average sectoral level.

In a number of construction organizations, norm-setting for pieceworkers' labor is oriented to a wage level which is coming about which entails the reflection, in the work orders, of a volume of jobs greater in extent than envisaged by Form No 2.

In order to keep non-fulfillment of assignments for growth in labor productivity from becoming facts, Orgtekhstroy [possibly Organization of Technical Construction] Trust, the Neftegazstroytrud [possibly Oil and Gas Industry Construction and Labor] Trust, of the Center for the Scientific Organization of Labor, and standardization and research stations must give more help to main administrations, associations and trusts in an effort to implement the achieve-

ments of scientific and technical progress and state-of-the-art methods of organization of labor, production and administration.

The main administrations, associations and trusts are faced with the task of analysing the causes for non-fulfillment of the assignments which have been set for increasing labor productivity. Measures need to be developed and carried out for maximun utilization of existing reserves. Among these measures are: increasing the output of construction equipment and reducing the volumes of manual labor for basic types of work; increasing the level of industrialization for labor-intensive operations and expanding the use of large-size gypsum sheetrock and gypsum-fiber sheets and polymer construction materials etc.; providing of all facilities under construction with plans for the production of labor, for flow-line labor-production charts, and the creating of conditions for the universal propagation of the multi-skill process flow-line production contract; widespread introducing into the construction industry of scientific organization of labor, organizing of an efficient production process and a reducing of down-time and losses of work time; improving the engineering preparation of the construction industry, eliminating violations of work procedures and strengthening labor discipline; the carrying out, in 1984-1985, of a combination of measures to enlarge construction and installation trusts and other construction subdivisions etc.

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PIPELINE CONSTRUCTION

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NEW PLANNING METHOD DISCUSSED

Moscow STROITEL'STVO TRUBOPROVODOV in Russian No 11, Nov 84 p 8

[Article by N. V. Komarov, of the Orgtekhstroy Trust, of Glavyuzhtruboprovodstroy at Rostov-na-Donu: "Planning Labor Productivity for Standard Relative-Net Output"]

[Text] Since 1 January 1983, Glavyuzhtruboprovodstroy [Main Southern Pipeline Construction Administration] has changed over to planning and evaluation of labor productivity for Standard Relative-Net Output [Normativnaya Uslovno-Chistaya Produktsiya] (NUChP). A great deal of preparatory work has been done: conferences have been held in the trusts with subdivision directors and line workers, and seminars were held with workers of planning, production and estimating departments. Much time was given over to separating NUChP from the estimated cost of completed work. The volume of NUChP was calculated according to volumes of work which were actually completed in 1982 and planned for 1983. The first correlation of the data which was obtained has shown that, using the existing method of calculation, the considerable effect of materials consumption on the volume of work done according to NUChP has been preserved.

Thus, the share of direct costs for NUChP in the volume of construction and installation operations for welding and assembly operations on pipeline construction amounted to 8-9 percent, but considering extra charges from the overhead expenses and planned savings and other limited expenditures, it came to 19-20 percent. The relative share of direct costs of NUChP in surface construction amounts to 16-17 percent, and taking all the coefficients into consideration, it amounts to 23-25 percent. Thus, it is as though the NUChP coefficients equalize, and the drastic effect of the structural shifts is not evident.

In the course of a year, volumes of completed NUChP were checked. To keep the check organized, the Orgtekhstroy Trust Economic Department developed and sent underlying data accounting forms and tables showing the accumulation of volumes of completed work, with the NUChP separated.

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COMPRESSOR STATIONS

EQUIPMENT KEEPS COMPRESSOR STATIONS OPERATING

Kiev PRAVDA UKRAINY in Russian 3 Oct 84 p 3

[Article by Department Head of the UkSSR Academy of Sciences Institute for Problems of Simulation in Power Engineering, Doctor of Technical Sciences, Professor M. Kulik: "The Rhythm of the Gas Rivers", under the rubric "In Competition for the UkSSR State Prize"]

[Text] The compressor stations located along a gas pipeline are equipped with gas compressor units with either gas-turbine or electric drive. Both require electric power. If the power supply should suddenly be cut off, work shuts down. To avoid stoppages, provision has been made for a supply of power from two sources. However, even in this situation, brief interruptions are still possible.

Stations which are powered by electricity are especially sensitive to momentary shutdowns. Loss of the power supply for even tenths of a second reduces the rotational speed of the motors, which they, by themselves, are incapable of regaining.

A group of co-workers from the Kiev Polytechnical Institute, the VNIPItransgaz [All-Union Scientific Research and Planning Institute for Gas Transport], and the Ukrgazprom [Ukrainian Gas Industry] Production Association made a study of the effects of power-supply interruptions of varying duration on compressor station operation. How is it possible to avoid the uninterrupted nature of a technological process?

To insure that electrically-powered compressor stations function uninterruptedly, the motors which have slowed down need to be insured of automatically starting up under load conditions during repeated occurrences of tension on their terminals, or, as the technologists say, they need to be provided with a self-starter. The problem which became most critical when designs were being developed was the task of how to keep the compressor station in operation, and not allow it to shut down should the power supply from the outside net be interrupted.

At compressor stations with gas turbine drive, automated diesel generators units were utilized as emergency sources of electric power. They started up automatically and bore the entire primary load. A system of switching cir-

cuits which matched the automatic equipment was developed, and control panels, automatic equipment and protective devices were designed.

The combined scientific and experimental investigations, which suggest a computer analysis, and the correction of the automatic equipment systems' operation as applied to specific projects, was all resolved by a collective of the "Electric Power Stations" Department of Kiev Polytechnical Institute. The combined programs of calculations were developed on computers which were approved for calculating the specific facilities, and which demonstrated a high degree of precision.

Efforts to introduce self-starting are being carried out for Saratovtransgaz [Saratov Gas Transport], Volgogradtransgaz [Volgograd Gas Transport], Kharkovtransgaz, Lvovtransgaz, and Surguttransgaz. Groups of calculations for Mingazprom [Ministry of the Gas Industry] were worked up based on programs which were developed in the Kiev Polytechnical Institute. E. P. Slizskiy, an associate professor of the Kiev Polytechnical Institute, and I. V. Bruev, a work superintendent at the Ukgazprom VPO in the Dnepropetrovsk Sector, were awarded the USSR Exposition of Achievements of the National Economy medals for research and introduction of self-starting systems.

The progressive systems for compressor stations have reduced the amount of emergency shutdowns 5-7-fold, and has amounted to an economic effect of over 25 million rubles. The collectively written work "The Development, Research and Implementation of Progressive Technological Systems for the Compressor Stations of the Main Gas Pipelines During Short-Term Interruptions in the Power Supply" has been deservedly nominated into the competition for the UkSSR State Prize.

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COMPRESSOR STATIONS

BRIEFS

KARAKUMSKIY COMPRESSOR STATION OPERATING--Ashkhabad--At the Shatlyk gas field, a new compressor station, one of the most powerful in Karakum, has joined the ranks of those already in operation. It will increase the gas flow considerably in the Central Asia-Tsentr main gas pipeline. [By S. Kim] [Text] [Moscow SEL'SKAYA ZHIZN' in Russian 25 Nov 84 p 1] 12659

ORENBURG NORMALIZING COMPRESSOR OPERATIONAL--Orenburg--Near the oblast center, in a gas field which is well-known to the entire country, an unusual pressure-normalizing compressor station has been put into pilot operation. During the 10 years since the beginning of the field's exploitation, gas well pressure has been decreasing. To bring it up, and at the same time provide stable, planned fuel recovery, construction of the new station was required. Facilities similar to this one are operation in many of the country's fields. However, they use only purified gases for pumping into the gas mains. In Orenburg, they have decided to transport fuel containing its natural impurities. The new station was developed by the major planning organizations in the country, and Leningradites checked out the systems. The innovation will have a considerable economic effect. [Text] [Moscow SEL'SKAYA ZHIZN' in Russian 22 Sep 84 p 1] 12659

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GENERAL

SHARYPOVO ORGANIZATIONAL, TECHNICAL PROBLEMS DISCUSSED

Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 20 Oct 84 p 2

[Article by B. Lichugin, managing director, Krasnoyarsk party kray committee, coal industry sector: "The Unlearned Lesson"]

[Text] The All-Union Conference for Development of a Special-Purpose Comprehensive Program for the Kanskiy-Achinskiy Fuel and Power Production Complex, which took place in Krasnoyarsk in mid-September, took major problems under consideration for the most part. The deadlines for solving some of them extend not just to the end of the 12th Five-Year Plan period, but all the way to the year 2000. Those giving reports used large figures for coal production, electric power output and financial and material outlays. Unintentionally, it seemed that the actions being taken by the numerous conferees, in setting up the country's largest power-production complex, are coordinated and in harmony with each other in time and space as never before, since forces as considerable as these have never before been brought to bear at one time, on a single matter.

But no; here too, the departmental interests and interdepartmental walls have turned out to be strong and solid. I will now cite such a fact. The majority of people giving reports at this conference have taken the start-up complex of the Berezovskaya GRES-1 first power block, which was authorized in the beginning of May, as the primary document for their analysis. It is supposed to be ready for operation next year, as is the first phase of the Berezovskiy open-pit coal mine.

The document was drawn up by specialists from the Rostov department of the Atomteploelektroproekt [possibly Nuclear-Powered Thermoelectric Power Station Planning] Institute, and approved by USSR Minenergo [Ministry of Power and Electrification] directors. Analyze its apathetic lines and you find no escape from the idea that the authors have not studied their predecessors' experience, in particular the close similarity of KATEK to Ekibastuz. Let us suppose for a moment that they went on along their original path. But why, then, were the faults at Ekibastuz not only not eliminated, but even raised a power?

As USSR Minenergo Deputy Minister P. Surov said in his report of April of this year at a meeting of the coordinating council attached to the party kray committee, "The Ekibastuz experience convinced me that the RPKB's [Regional Production and Procurement Center] underestimation and the dragging out of its deadlines for set-up would lead to huge labor and time losses." And in May, two deputy ministers authorized the start-up complex, which was reduced because of the center's other projects.

In Ekibastuz, it became evident that the workers' bus transportation to and from the GRES work-site was totally unacceptable, and the material losses and mental harm which resulted from this lack of organization were considerable. Minenergo pointed out that putting the first construction train for transporting the workers into operation only after ten years since construction on the line began, was a major fault. In just the start-up complex for Sharypovo, it is assumed that 24 thousand persons in 1985, and 33 thousand in 1986 will be transported to the GRES work-site expressly by buses. Completion of work on the intra-area rail lines and even the motor vehicle roads is envisaged no sooner than the year the first power block is started up. And no definite decision has been made on the planning for the rapid-transit trolley lines.

The large-panel house-building plant should be set up at overtaking rates, and this is one more of the indisputable lessons to be learned from Ekibastuz. In Sharypovo, this kind of plant, capable of an output of 140 thousand square meters of living space has hitherto not been completely put into operation, and houses are being assembled from elements which are hauled in. As a result, there is a high labor turnover, and this young city has been provided with only 40 percent of its children's institutions, and 70 percent of its school sites. Fifteen hundred women sit at home while the construction project suffocates from a shortage of workers.

At Ekibastuz, their finely-tuned system of material and equipment supply had a positive effect on the progress of construction. But here at KATEK, construction on the USSR Gossnab center is proceeding very slowly, and so far, only a little over half of the equipment has been acquired. An efficient supply system cannot be set up without a depot.

At a meeting of the coordinating council, USSR Minugleprom [Ministry of the Coal Industry] and USSR Minenergo directors had quite a comprehensive discussion regarding the present-day need for the fullest possible consideration and utilization of the experience gained from setting up the Yuzhno-Yakutskiy and Ekibastuz complexes. Here is how the task was set: to take from the above experience all that which is positive and on no account to tolerate a repetition here of the mistakes and miscalculations which existed there. Workers of the Sharypovo power-production construction trusts traveled to Ekibastuz repeatedly to do research on the experience accumulated there, and it seemed that now, on the erection of the Berezovskaya GRES-1, everything was going to be well thought out and organized in exemplary fashion. But then the departments began to develop a new region, and everything starts over at square one.

For example, USSR Minenergo has decided that during the start-up period in 1985, triple the planned volume of large-scale construction and installation

work will be accomplished at the Berezovskaya site. [illegible]
[illegible] At the very moment the start-up complex was approved, the plan had been 93 percent fulfilled, and less than 1% was done by the in-house work force of the KATEKenergopromstroy (Kansko-Achinskiy Fuel and Power Production Complex Power Production Industry Construction) Association, General Contractor. And here are the results of this policy: judging by all the calculations, the power block will be started up no earlier than October 1986.

The military designers of this ministry have developed a [illegible] installation of a boiler system which is unprecedented in domestic practice. A half year will elapse in the consolidated assembly of structures in special areas and in the thermal installation facility, 22 months will pass for the installation operation, and start-up and trouble-shooting operations will take two months. In order to keep the installation operation within the strictures of these deadlines, 3,500 skilled installation workers will be needed. A collective of the Vostokenergomontazh [Eastern Power Plant Installation] Trust is readying itself for the installation with a high degree of responsibility. There are training programs for the workers, and a study model of the boiler has been made up, on which operational procedures are worked out, along with the sequence of operations. However, the logistical systems for the power-production installation workers, i.e., the consolidated installation areas, the thermal equipment installation facility and the workshop and household facility group, are still not ready.

On just what resources were the authors of the start-up complex counting? These: they planned to throw the entire work-force into the start-up of the first power block. And what is already a substantial lag in the growth of the production and social infrastructure will increase rapidly as a result of this strategy. All of ESO Minenergo's subcontracting installation organizations, which are now at work on the basic construction of homes and dormitories for their [illegible] will be transferred to develop power production facilities.

At a session held in city [illegible] at a meeting of the coordinating council, the [illegible] of the Yeniseyskiy Gorkom and the program for 1986 encompassed the [illegible] of the rural development of the industrial region and the city, the construction industry facility, and further KATEK prospects. Once again the deputy minister's conclusion is supported by the ideas set forth at the start-up [illegible]. It was not so long ago that Ekibastuz endured the serious "illness" caused by the disintegrated development of its power production complex, with its concomitant injury to the national economy. The department did not profit by this lesson: the same disease has begun to afflict the young KATEK organism. Today it is unclear: just who is to build the homes, schools, stores, kindergartens and hospitals, i.e., the very things without which neither the city nor the first GRES can exist? The civil construction trust, which is part of the KATEKenergopromstroy Association, is undermanned, and handles around a half-million rubles a month in construction and installation work with its own workers.

The participants of the All-Union Conference talked concernedly about the fact that 3-5 times more assets need to be expended to develop the social infrastructure than are now being spent, and only then will this imbalance, tolerated during the last few years, be levelled out.

The hurried authorization of the half-finished start-up complex of the Berezovskaya GRES-1 first power block also put USSR Minenergo in a complicated position. It, too, examined and approved putting the facilities listed for the start-up complex into operation in 1985. The resultant schedule was extremely intense. For example, in order to speed up erection of the 15-km conveyor line used to deliver coal from the open pit mine to the GRES, it was initially planned to assemble the gallery sections together with the conveyor sections at a special area, and then the installation workers were to install them in place and join them together. This was to be the case should the power-production workers require the coal in the 4th quarter of 1985. And if not? Then the 2nd conveyor line structures have to be carried along the entire length of the right-of-way, lifted up and installed inside the gallery at a tremendous outlay of time and manual labor.

As the conveyor is being tried out under a load, 300 thousand tons of fuel will be delivered to the GRES coal storage site in three days. In the absence of the power block, no one can say what else will be done with the conveyer later. And there are dozens of these technical and organizational disorders and absurdities at the juncture of the two departments.

Recently, the board of directors of the Berezovskaya GRES-1, now under construction, invited workers from the planning, scientific research, construction and installation and adjustment organizations to gather, so that all of them together could analyze the lessons of Ekibastuz, and work out organizational, technical and other measures which would foster more complete utilization of this experience in the construction of the first power block at Sharypovo. The client and his subcontractors did a fine piece of work. However, these measures were not afforded the needed attention in USSR Minenergo. Discussions about the use of the Ekibastuz experience in the practical affairs of of KATEK are not being supported. And it follows that it is still somewhat premature to make a satisfactory evaluation of how well the lessons of Ekibastuz have been mastered.

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GENERAL

SOCIALIST COMPETITION, COMPETITORS DISCUSSED

Moscow PRAVDA in Russian 1 Dec 84 p 1

[Unattributed article: "The Power of the Millions--to the Five-Year Plan!"]

[Text] The plans of the party and the people for the concluding year of the five-year plan are significant and real. All sectors of the national economy have fixed new frontiers, calculated for the effective yield of the powerful productive and scientific and technical potential of the country, and calculated to achieve high final results along the entire vast economic front. The successful realization of the plans will, as always, be furthered by the socialist competition which is developing today under a symbol of readiness for the 26th CPSU Congress and the 40th Anniversary of the Soviet People's Victory in the Great Patriotic War.

The scope and effectiveness of the labor competition depend first of all on how the competition is directed at solving key tasks, and on how promptly and accurately these tasks are set before each competitor. It is precisely this widespread support for the initiative from below, and the creation of the necessary economic and organizational conditions for developing the creative activity of the masses which permits result-producing work, and enhances utilization of resources--in a word, the rational running of the economy. And in our time this requirement, as noted by comrade K. U. Chernenko, must permeate the work of all industries, and all enterprises.

Right now, socialist obligations and counter-plans for the upcoming year are being developed in the collectives. The working people in city and village are revealing additional possibilities, and are striving for complete utilization of the experience which has been accumulated by the best enterprises and construction projects, kolkhozes and sovkhozes, and scientific institutions. The reserve is vast!

For example, today oil workers and coal-miners have as yet not managed to meet their plans. Meanwhile in this, that and the other sector, there are collectives which are doing excellent work, and producing output above their assignments. We can name, for example, the small industries in Tyumen, which are part of the Belozerneft' [Belozerskiy Petroleum] Administration, which have been able to overcome difficulties quickly and move on out to their stipulated quotas. Or take the Krasnolimanskaya Coal Mine, in the Donetsk Basin. Work-

ers there completed their yearly plan two months ahead of schedule. Meanwhile, in both Tyumen and the Donbass, along with the leading workers, there are collectives which are lagging behind, even though they work in approximately the same conditions. And similar facts exist in other sectors. They attest to the fact that the ability to have experience at their disposal, and to put it into the service of the five-year plan is far from ubiquitous. But here and there they simply content themselves with average, safe indicators.

All opportunities to improve operations will be registered. And the competition must reveal its tremendous mobilizing and educational power everywhere, and must act as a powerful lever for carrying out our plans. Naturally, what is needed for this is a well thought out approach to its organization, taking the real conditions and tasks into consideration, the insuring of widespread accord, and the creation, in every collective, of an atmosphere of creativity and comradely mutual aid, and a highly principled and responsible attitude. It is especially important to display these qualities when checking on the socialist competition. What is needed here is not empty appeals or noisy displays, but a profound and systematic analysis of the results, and the working out of effective measures capable of eliminating breakdowns, and leaning strongly on the best experience.

Among the pressing concerns of the competitors is the rational utilization of all their resources. Efforts are being carried out in this direction, and several groups here have things to learn. However, many enterprises have not coped with their assignments regarding economising material resources, particularly fuel and electric power. Lessons should be learned from miscalculations and now, in the course accepting socialist obligations and counter-plans, we should work up concrete measures to intensify an economizing system. It is difficult to overrate the importance of the initiatives of the country's leading collectives, which have decided to e blish a fund of above-plan savings in their enterprises and to spend n ss than two days per year working on savings in materials, raw materials stocks, and fuel. The number of adherents to this patriotic initiative is growing, and the duty of party, trade union, and komsomol organizations, and managers of economies is to support the enthusiasts in a business-like manner and to make the economizers' movement truly a mass movement.

Our plans are oriented toward boosting intensification and raising the technical level of production. It is natural that the competitors' attention is focused on measures for accelerating the growth of labor productivity, the effective utilization of capacities, and improving the quality of their output. Thus, in the most advanced enterprises of Moscow, Leningrad, and Minsk, while realizing their counter-plans, they have insured a large increase in labor yield and an additional reduction in the production cost of products. The achievements of the Dnepropetrovsk mechanical engineers is widely known in regard to their improvements in the work place, this fame being based on their references. These successes need to be strengthened and multiplied. There still remains a lot of work to do to improve the quality of output. Here, it is extremely important to rest on the initiatives of the masses. The use of state-of-the-art equipment and manufacturing procedures needs to be combined with the skill and working acuity , and the high professional preparedness of the competition participants. Workers of outstanding quality should be ably stimulated, and careless workers tangibly punished with pay cuts.

In the struggle for the fulfillment of plans and the development of competition, and in propagation of advanced experience, the leading role of communists is fully revealed. In addition to displaying a personal example of a creative attitude to their work, and an example of a high degree of organization and discipline, they are irreconcilably opposed to any shortcoming, and to everything that hinders the amicable and inventive working of the collective. The work of the trade-union and komsomol organizations who have been called upon to develop the labor initiative, to support the innovators, and, day in and day out, to check on the fulfillment of socialist obligations, depends in great measure, too, on their purposefulness and their skill in unifying and guiding the common efforts.

The new plans and tasks give powerful impetus to the creative enthusiasm of the workers of the Land of the Soviets. The motto of all the competition's participants is to do shock work, and give a full return, to conclude this year and achieve new successes in the final year of the five-year plan.

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GENERAL

KANSK-ACHINSK COAL SMOKE POLLUTION PROBLEM DISCUSSED

Moscow PRAVDA in Russian 17 Oct 84 p 3

[Article by V. Prokushev, PRAVDA correspondent: "Should We Pay for Smoke?", under the rubric "Man and Nature"]

[Text] The time is approaching for the first block of the Kansk-Achinsk Fuel and Power Production Complex' thermal station to be put into operation. The dove-colored smoke from the 380-meter-high stack brings the problem of environmental protection to mind. "PRAVDA" has already written about the problems of utilizing and rendering harmless the ash which is caught by the electrostatic precipitators. But part of it, which is carried aloft by the hot gases, will be carried away into the atmosphere. In addition, sulfur oxides, nitrogens, and heavy metals get into the air.

In regions where large thermal electric power stations (TES's) and other enterprises are located, the industrially-developed countries have collided head-on with this extremely acute problem. The dispersal of TES's and other enterprises, and serious measures for safeguarding our country's environment are alleviating the acuity of this problem. But thermal power production continues to grow vigorously, including in the Ekibastuz and Kansk-Achinsk coal basins. We must not lose sight of this.

Under the aegis of the GKNT [USSR Council of Ministers' State Committee on Science and Technology], a large group of scientists from a number of institutes have begun work on a solution to the problems of environmental protection in the KATEK [Kansk-Achinsk Fuel and Power Production Complex]. For the purposes of coordinating their efforts, an interdepartmental scientific and technical council, attached to the GKNT, was formed to deal with the combined problems of protecting the environment and utilizing natural resources rationally. There are three components of the exhaust gases which are the most "intolerable" of all for the atmosphere. Up to half of the total amount of harmful substances are from sulfur dioxide, about a third from nitrogen oxide and about a fourth come from fly ash. The coals of the Kansk-Achinsk basin are low in sulfur content, but nevertheless, taking into consideration the great amounts of them which are burned, the problem of reducing the sulfur dioxide discharge becomes all the more acute. In cases such as these, chemical methods are the most effective.

As I. Mindrul', director of the Giprogazoochistka [State Gas-Cleaning Installation Design] Institute tells it ,"A number of methods have been scientifically worked out and tested to reduce sulfur dioxide waste gases. These are the lime, the limestone, the magnesite and the ammonium-cyclic methods. With the first two, the neutralized dioxide, as a rule, goes to the dump. With the others, it is reprocessed into sulfuric acid.

A dilemma arises in this connection: which method should we use? The limestone and lime methods are relatively low in cost, while they raise the cost of a kilowatt-hour by about 10-15 percent. The ammonium-cyclic and the magnesite methods require expensive trapping devices and corresponding enterprises to reprocess the sulfur dioxide into acid. Here, the reagents are locked into the cycle, fewer of them are needed, and almost nothing goes to waste, but the cost for a kilowatt-hour of electricity is raised by 25-30 percent. True, you have to take into account that a useful secondary product is produced.

So what is the practical state of affairs here? Right off, let us say that the power engineers are quite reluctant to equip TES's with sulfur-trapping devices. Thus, the design for a pilot operation for cleaning stack gases by the magnesite method for the Ryazanskaya GRES, which was developed in 1976 by the Giprogazoochistka Institute and NIIOGaz [State Scientific Research Institute for Industrial and Sanitary Gas Purification], was not realized. And today USSR Minenergo has no efficient program for the introduction of sulfur-trapping devices. "As complex as the battle against sulfur is, we at KATEK cannot forget the need to suppress the nitrogen oxides," believes L. Kropp, who heads the Department for Protection of the Atmosphere at the All-Union Heat-Engineering Institute imeni F. E. Dzerzhinskiy. In principle, it is possible to build an apparatus, in which nitrogen oxides would be trapped or suppressed by chemical means. But so far, none exists, and research is going on to find the best ways to reduce formation of nitrogen oxides as the coal is burnt. Here, we need to attain relatively low furnace temperatures, and see to it that less oxygen is introduced by the air-draft. The problem is extremely complex. Indeed, when the temperature is reduced, and there is a shortage of oxygen, there arises the risk of underburning the coal, then allowing the unburned particles to escape into the air through the stack. But our domestic science and our practice in boiler construction has taken successful steps in this direction. Thus, the boiler-builders have devised a unit for KATEK's first station--the Berezovskaya GRES-2, which in great measure meets the requirements for environmental protection, and right now they are proposing a new, improved design for it. At a 500-megawatt block of the Nazarovskaya GRES, specialists are testing a progressive swirling-type furnace which considerably reduces the formation of nitrogen oxides. Enthusiasts of the Leningrad Polytechnical Institute have completed some very useful work, having devised a boiler with a low-temperature swirling-type furnace. It can reduce the formation of nitrogen oxides two-fold One of these units has been manufactured by the Barnaul Boiler Plant. It was suggested that it be installed at the Ust-Ilimskaya TETs [Heat and Electric Power Station], but the equipment which was delivered to Angara has been lying around for years, unused. Boilers with the so-called "fluidized bed" are being adopted very slowly.

And the problem of controlling fly ash was not resolved until last. It is non-toxic, but in large accumulations in the atmosphere, it blocks sunlight. It is trapped with the help of electrostatic precipitators--structures the size of a multi-storey building, which are extremely complicated and capricious. For example, at the Ryazanskaya GRES, which is staffed with skilled operations personnel, the electrostatic precipitators work just fine. However, at the Ekibastuzskaya GRES-21, where they were unable to give prior training to the specialists, it often happens that the electrostatic precipitators break down, and the ash flies into the air. At the Nazarovskaya GRES, only 87 percent of the ash is trapped, at an overall requirement of 99 percent.

But what does even one percent mean for KATEK, where each station will produce, per year, a million-plus tons of ash? The pressing problem of increasing the operational efficiency of the electrostatic precipitators remains. Co-workers of the Giprogazoochistka Institute have proposed the installation of a two-storey electrostatic precipitator, designed by them, and having electrodes which are eight meters long. This will make it possible to raise the percentage of ash trapped, as they believe, to better than 99 percent.

The general conclusion is that the problem of protecting the atmosphere from harmful waste gases has basically, although not yet completely, been solved by science. The matter depends on the active implementation of the results of developments in thermal engineering. And many obstacles are arising on this very road, particularly in the form of interdepartmental barriers. Perhaps the power engineers, too, would have taken an active role in the work on oxide entrapment, but want a guarantee that the chemical industry will compensate them for their expenditures. Economic levers need to come into play here, though at this time they haven't.

Also, there are no procedures for determining the damage done by contaminative substances to the air, and, accordingly, to the national economy. Meanwhile, it is a known fact that steel is damaged from corrosion six times faster in an industrial city than in rural areas.

Here, sanitation legislation has not yet made its significant contribution. The so-called norms for maximum allowable concentrations [PDK] of harmful substances in the air, are still in force. In order to observe the norms to the letter, it has been decided to go the route of constructing gigantic exhaust stacks. But even in this instance, the wastes are still going to fall on the ground somewhere. The scientists believe that the time has arrived to control PDV [maximum allowable smokestack wastes] by each individual boiler house. In other words, each enterprise must legally and economically answer for the purity of its output, and when established norms are violated must, so to speak, "pay for smoke". This will stimulate the development of low-exhaust technologies, and the introduction of protective equipment.

KATEK can and must become an example of the correct and proprietary attitude toward Nature in this country.

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GENERAL

SEARCH FOR FOSSIL SUBSTITUTES IMPORTANT ENERGY COMPLEX TASK

Moscow PLANOVOYE KHOZYAYSTVO in Russian No 10, Oct 84 pp 3-8

[Article by A. Troitskiy, department chief of the USSR Gosplan: "The Substitution of Organic Fuel--An Important Direction of the Development of the Fuel-Energy Complex"]

[Text] The processes that have occurred during the past few years in the area of fuel and energy, both in the world and in our country have been unprecedented in terms of scale and dynamism; these processes have led to the rise in the influence of the energy factor in the economy of the modern society. Analysis shows that the role of this factor will become stronger in the future. This required the revision of the paths of development of the power industry. The move of the raw material base of organic fuel to the East in the presence of the preservation, during the foreseeable future, of a significant share of the energy consumption of the country in the European part and the simultaneous rapid reduction of the dimensions of fuel extraction here have leads to a sharp increase in the resource intensiveness of the growth of organic fuel extraction. Capital investments for the maintenance of the attained level of oil extraction are growing. Drilling depth, the rate of water encroachment of the oil being extracted, and its transportation distance are increasing.

The average distance of the transportation of gas is increasing, and during the current five-year-plan the entire increase of its extraction for the country will be obtained in the remote regions of Western Siberia.

The basic increase of the extraction of coal is also being realized in the eastern regions of the country; here efficient deposits of open coal extraction are being developed. At the same time, the mining and geological conditions of the underground mining of coal in the European part of the country and in the Urals are becoming complicated because of the growth of the depth of coal excavation, the exploitation of increasingly thin layers, etc. All of this leads to the increase in expenditures for coal extraction and the reduction of its extraction in the European part.

As a result, the share of capital investments and resources directed by the national economy toward the development of the fuel-extracting industries is increasing.

In connection with this, the following was determined as one of the important directions of strategy in the sphere of the extraction of fuel and power: The reorganizationof the structure of the consumption of fuel and energy resources by means of the reduction of the utilization of oil fuels and every conceivable economy of organic fuel through its substitution by other forms. A great deal of attention has been given to these questions in the recent past. It seems to us that, from the position both of today and of the future, the search for, and the realization of, economically substantiated ways of substitution of traditional organic fuel by other types of energy is of principal significance.

During the contemporary stage of the development of scientific-technical progress, there are a number of directions which make possible the practical realization of the involvement of other primary resources in the fuel and energy balance of the country (instead of organic fuel): Nuclear energy, traditional renewable energy resources (water power), non-traditional renewable energy resources (solar, geothermal, wind and other types of natural energy), low-potential natural and disposable energy resources, and biogas.

Theoretically and practically demonstrated is the economic efficiency of the utilization, already during the present stage, of nuclear energy for its transformation into electric power and heat in regions with organic fuel imported from afar. As is well known, a broad program for the construction of nuclear power plants (AES) has been developed in the USSR. The task presents itself of fully securing, already in the next few years, the entire growth of electric power production in the European regions of the country through nuclear power plants. To this end, bases for the nuclear power engineering industry and construction industry and a system for training nuclear power engineering personnel have been created in the country and will continue to be developed. Calculations show that already during the current five-year-plan as many additional primary resources will be drawn into the fuel and energy balance of the country as will be obtained from the increase of oil extraction.

The intensification of the levels of electrification of the technological processes in industry and in transportation, as well as in agriculture and in the municipal and consumer economy on the basis of the electric power produced by nuclear power plants opens up additional possibilities for the reorganization of the consumer part of the fuel balance on the side of the reduction of the use of types of organic fuel in short supply. Among the technologies, where such substitution of organic energy sources under certain conditions is efficient already at the present time, one can include the electric drive for the compressors of cross-country gas pipelines, electric furnaces in metallurgy and machine building, drying and heating in a number of production processes, the production of heat energy with its accumulation during the night in a number of regions of the country, electric traction, and in the future--the electric motor car. A significant share of the production of heat energy for large cities can also be securedthrough the production of heat at nuclear thermoelectric plants and boiler houses, the construction of which has already been developed.

To secure the industrial use of nuclear power, it is necessary to solve a complex of economic and scientific-technical problems, above all questions of the

development of nuclear power in all parts of the plans, including resource supply, as well as the fulfillment, by the USSR Ministry of Power and Electrification, the Ministry of Power Machine Building, and the other machine building ministries, of the plan tasks established for them in this sphere.

The USSR Ministry of Power and Electrification in the past few years has been ensuring an annual significant increase in the volumes of major operations being carried out in the construction of nuclear power projects.

For the accelerated development of nuclear power, it is necessary to develop effective methods for the regulation of the capacities of the power systems which have a large proportion of nuclear power plants (without the installation of organic fuel-based power plants for these purposes), to create nuclear plants of industrial heat supply and methods of the direct utilization of nuclear power in other industrial technologies, the development of fast reactors that make it possible to significantly improve the use of natural uranium. Finally, the extensive prospects of the substitution of organic fuel by nuclear power will open up the creation of thermonuclear power plants.

The production of electric power in hydroelectric power stations continues to grow, which makes it possible to release organic fuel resources. And although in terms of established capacity of hydroelectric power plants the USSR occupies second place in the world, the utilization of the effective hydroelectric power potential of the country's rivers is inadequate.

Our domestic power industry, power construction and power plant industry are equipped with advanced scientific-technical achievements and are completely prepared for the the development of this potential. For this it is necessary to search for resources and to secure the priority in the allotment of capital investments. In the planning of capital investments, it is necessary to take into account that, for the substitution of every ton of equivalent fuel, 4 times less investment is needed in hydropower engineering than for the same increase in oil extraction, and 2 times less than in the coal industry. This is explained by the renewability of hydropower resources and by the possibility of maintaining the attained level of power extraction without any expenditures in contrast to the extraction of organic types of fuel.

Among the renewable types of energy alternatives to organic fuel, solar and geothermal energy is attracting a great deal of attention throughout the world. The resources of solar energy are so great that, given the creation of economically acceptable technical means of their utilization, it is possible to satisfy all the energy requirments of mankind, moreover without ecological disturbances.

Most favorable in terms of climatic conditions for the utilization of solar energy are Central Asia, Kazakhstan, the Caucasus, the south of the RSFSR and the Ukraine, the Trans-Baykal Region, and som other regions of the Far East. About 130 million people live in these areas. Here every square meter of surface warmed by the sun, given contemporary technical means, can secure the replacement of 100 to 200 kilograms of equivalent fuel a year. The basic directions of the practical use of solar energy are heat supply (mainly hot water supply) and the production of electric power.

In the sphere of heat supply, the potential possibilities of economically substantiated substitution of organic fuel, according to data of the USSR State Committee for Civil Construction and Architecture, in the near future amount to about 40 million tons of equivalent fuel a year. At the present time, more than 40 projects designed for different purposes have been built with experimental-industrial systems of solar heat supply, including multi-apartment and multistory dwellings, pioneer camps, hotels, boarding-houses, showers, etc. More than 100 plans for solar heat supply projects have been developed, the construction of which is being completed in the current five-year-plan.

However, on the whole the state of the work on the use of solar energy for the purpose of heat supply cannot be recognized as satisfactory. The USSR Ministry of the Construction Materials Industry did not fulfill the established tasks for the development of the production of solar collectors for these purposes. The prices for the collectors produced, which were set by the Bratsk Heating Equipment Plant of this ministry, are unreasonably high. There was an inadmissible delay in the fulfillment of the tasks in regard to the organization of the production of solar collectors made of aluminium alloys by the USSR Ministry of Nonferrous Metallurgy. Already in 1955, this ministry was charged with securing the creation of significant capacities for the production of such collectors. However, to this day, the USSR Ministry of Nonferrous Metallurgy even has not developed the necessary technical specifications for the development of the appropriate capacities of the Sumgant Aluminium Plant.

In our view, the state planning committees of the union republics, above all the Central Asian republics, are not satisfactorily studying the questions of the use of solar energy, their work is poorly coordinated. For these republics, tasks have been established in regard to the substitution of organic fuel by solar energy. However, in the plan indicators approved by the republics these tasks are not reflected. This question requires the attention also on the part of the USSR Gosplan.

It must also be noted that the USSR State Committee for Civil Construction and Architecture--although it has done certain methodological work and exercises practical leadership in the planning of the necessary projects, up to the present time has not created and has not approved appropriate normative documents for the planning and construction of solar heating installations.

There are different points of view, both in the world and in our country, in regard to the questions of the efficiency of the use of solar energy for the production of electric power. It is indisputable, however, that the modern technical level of the means of converting solar energy into electricity does not secure for the time being the economic prerequisites for the broad industrial use of this direction. For the practical approval of the economic efficiency of solar electric power plants and the search for paths of their perfection, it is necessary to continue the installation of experimental-industrial installations that has already begun, including the solar electric power plant with a thermodynamic converter in the Crimea with a capacity of 5,000 kilowatts, which the USSR Ministry of Power and Electrification should put into operation in 1985. This will make it possible to determine the prospect of the present direction.

Work on the utilization of geothermal energy is conducted in the same two directions: For heat supply and the production of electric power. The low limit for the efficiency of the use of geothermal heat for the production of electric power is its temperature potential of 150-200° C. If in the 1970's there were only a few countries in the world which utilized geothermal heat, the interest in this source of energy increased rapidly in proportion to the rise in the price of fuel, and geothermal plants are being operated, built or planned in more than 50 states. Today geothermal electric power plants are operating in 12 countries with a total capacity of about 3 million kilowatts, and 32 countries have developed programs for the utilization of the energy of underground heat. According to estimates by U.S. scientists, about 10 percent of the population of this country can be provided with an economically efficient heat supply from this source.

Corresponding work on the utilization of geothermal energy has also been developed in the USSR, with the Ministry of the Gas Industry appointed as the head ministry for the given problem. In 1982 it created in the city of Makhachkala the Soyuzburgeotermiya Scientific Production Association for the Use of Deep Heat from the Earth, which is increasing the volumes of the extraction of thermal waters. The utilization of the latter makes it possible to save 500,000 tons of organic fuel in conventional calculus. On Kamchatka the Pauzhetskaya Geothermal Electric Power Station, with a capacity of 11,000 kilowatts, has been working for many years.

At the present time, work is being done on the exploration of deposits of geothermal energy, however it is is being realized slowly. The tempo of the exploration work is completely inadequate. The Ministry of Geology was behind schedule with the exploration of the Mutnovskoye deposit by almost two years, which delays the planning and the beginning of the construction of an electric power plant that is extremely necessary for Kamchatka.

The Ministry of the Petroleum Industry and the Ministry of the Gas Industry have, for a long time and not at the proper level, conducted work entrusted to them in regard to the drilling and construction of a group of wells of the Kayasulinskoye deposit (in Stavropol Kray) and the Tarumskoye deposit (in Dagestan). This does not allow the completion of a complex of interesting work on the economic substantiation and study of the technical possibility of the construction of experimental electric power stations, operating on a closed geothermal circuit, i. e., with reverse injection into the layer of the processed heat-transfer agent for its repeated heating. The Ministry of the Gas Industry, to this day, has not completed the general scheme for the utilization of geothermal energy. The tempo of the work on the organization of the production of specialized equipment for the drilling and construction of wells in conditions of high temperatures and pressures requires intensification. The research on the long-term operation of geothermal equipment in heat-transfer agents with a high level of mineralization has not been completed. Work on the extraction of valuable rare-earth elements from geothermal waters is being conducted by the USSR Ministry of Nonferrous Metallurgy only in the preplanning stages.

According to calculations, carried out by the All-Union Scientific Research Institute for Complex Fuel and Energy Problems attached to the USSR Gosplan, the volume of the economy of organic fuel from the use of deep heat of the earth

can already by the end of this century reach 20 million tons of equivalent fuel a year. Considering the large volume of drilling operations, which must be carried out to solve such a task, one can argue about the concrete period for the achievement of such a magnitude of economy, but it is indisputable that such possibilities in the developing power engineering situation cannot be disregarded.

According to available estimates by scientists, it is possible to count on the utilization of no more than 0.5 percent of the wind energy that is available on the earth. However, this is equivalent to 40 percent of the energy used by mankind and significantly exceeds the economic potential of the water power of the planet. With a wind velocity of 5 meters per second and a conversion efficiency factor of 30 percent, the capacity of wind equipment can attain 50 watts per 1 square meter of sail.

According to the estimates of a number of scientists abroad, in some countries with high wind potential, by virtue of this energy, in the future (the next 20-40 years) the production of power of up to dozens of percent of the total power consumption by wind installations can be attained.

In the conditions of the USSR, the greatest economic efficiency of the use of wind power plants is attained in the zones with an average annual wind velocity of 5 meters per second and more. Such zones include the sea coast of the Baltic Sea, the Black Sea, the Sea of Azov, the Caspian Sea, the Sea of Okhotsk, Lake Baykal, the southern regions of the European part of the country and Western Siberia, the Maritime Kray, Kamchatka, and the Kurile Islands. Satisfactory economic efficiency is attained in a range of average annual wind velocities of 3 to 5 meters per second, which prevail on a large part of the territory of the USSR. According to estimates of the All-Union Scientific Research Institute for Complex Fuel and Energy Problems attached to the USSR Gosplan, in the next 20 years the substitution of organic fuel by wind energy in the amount of up to 15 million tons of equivalent fuel a year can be secured.

The program developed by the State Committee for Science and Technology and the USSR Gosplan, jointly with interested ministries, envisages the use of wind poweras a source of decentralized power on the basis of assemblies of small unit capacity basically from 2 to 30 kilowatts and in the form of large wind generators of electric power for the centralized electric power supply.

However, the practical realization of the use of wind energy is being implemented an inadequate rates of speed. As the head organization, responsible for the introduction of wind installations for decentralized power supply in the country, the USSR Ministry of Land Reclamation and Water Resources was appointed, as part of whichthe Vetroen [Wind Power] Scientific Production Association was created and which includes the Astrakhan Vetroenergomash [Wind Power Machinery] Plant, which are called upon to carry out the planning, production and assembly of wind plants with a capacity of up to 100 kilowatts. At the same time, the volume of the production of wind plants is completely inadequate. The unit capacity of the plants being produced for the time being is small. The plans for the creation and organization of the serial production of plants with a capacity of 16 to 30 kilowatts have not been fulfilled by the USSR

Ministry of Land Reclamation and Water Resources, and the experimental models of such plants have not passed state tests up to now. Work on the reconstruction of the Vetroenergomash Plant, aiming at the expansion of its production base, is being carried out unsatisfactorily by this ministry, and the production and creative contact with the associated ministries--the Ministry of the Electric Equipment Industry and the Ministry of the Aviation Industry--has not been set going.

The creation of large wind power plants for the centralized power supply was begun with great delay in our country. This work was entrusted to Gidroproyekt [All-Union Order of Lenin Planning, Surveying and Scientific Research Institute imeni S. Ya. Zhuk] of the USSR Ministry of Power and Electrification, but at the present time it has not yet come out of the pre-planning and design stage. The technical possibility of the creation of such plants with a unit capacity of 3,000 to 15,000 kilowatts with encouraging economic indicators was made known by the Institute. The USSR Ministry of Power and Electrification will have to accelerate the determination of the technical profile and the substantiation of the construction of wind installations for the centralized electric power supply.

According to available calculations, the quantity of biomass produced annually on earth is equivalent in terms of power to 10 times the annual commercial extraction of oil on the planet. According to the most modest estimates of specialists of the EEC, by the year 2000 up to 5 percent of the gross consumption of power in these countries will be secured through biomass, and according to data from American sources, already in 1990 the share of power produced from biomass in the energy balance will reach 4.5 percent in the United States.

Calculations completed by the All-Union Scietific Research Institute for Complex Fuel and Energy Problems attached to the USSR Gosplan have shown that there is a possibility of involving the power potential of biomass in a volume exceeding 25 million tons of equivalent fuel in the fuel and energy balance of the country within the next 15 to 20 years. Through the processing of wastes of animal husbandry, unutilized straw, timber raw material, and residues that develop in the process of cleaning of sewage. However, this important channel for the substitution of traditional organic fuel is practically not being used in our country today. A scientific-technical program which envisaged the construction of 5 first experimental-industrial bioenergy installations for the processing of wastes of animal husbandry and poultry farming has been developed, but it is being implemented with delay. It must be said frankly that the USSR Ministry of Agriculture does not manifest the requisite understanding of the importance of this problem.

A special place in the work on the reduction of the consumption of organic fuel is occupied by low-grade natural and disposable power resources. Among them one can include the heat of ventilation effluents of industrial and municipal buildings, waste water, the natural heat of large water masses (seas, lakes, rivers), and free air.

The utilization of this energy may be regarded as the substitution and economy of organic fuel. The steady increase of expenditures for organic fuel many

[illegible] assistance in this matter to other sectors of industry. The successes of the workers of the Ministry of the Electronics Industry were noted with an award of the USSR Council of Ministers for achievements in the sphere of science and technology.

[illegible] the framework of the present article we have briefly examined the basic paths of the substitution of organic fuel by other resources. We did not dwell here on a number of directions, where the broad industrial prospect for our country for the time being is remote, such as the utilization of sea tides, waves, the thermal energy of the oceans, etc. However, even from what has been said it is clear that the substitution of organic fuel is already becoming, on the practical plane, the most important direction of development of the fuel and energy complex of the country. The data cited above make it possible to assert that alternative sources of energy to organic fuel can in the future [illegible] the satisfaction of a large part of the necessary growth of fuel and energy resources.

All of this requires appropriate conclusions and a serious attitude toward the given direction of work on the part of the planning organs. What is evident is the necessity of creating, within the structure of the USSR Gosplan, a special subdivision (section) for the utilization of these resources in the national economy, which performs the general coordination of work in the given sphere. The enterprise is hindered by the absence of accounting and accountability in our country with respect to the utilization of nontraditional sources of energy in the national economy. The USSR Gosplan, together with the USSR Central Statistical Administration, must take care of the organization of this work as well.

[illegible]: Izdatel'stvo "Ekonomika", "Planovoye khozyaystvo", 1984.

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GENERAL

NORMATIVE ACT FOR ELECTRIC POWER CONSUMPTION LIMITS

Moscow BYULLETEN' NORMATIVNYKH AKTOV MINISTERSTV I VEDOMSTV SSSR in Russian
No 10, Oct 84 pp 3-9

[Normative Act on the Procedure for the Confirmation, Apportionment and Reapportionment of Limits for the Consumption of Electric Power Set Forth in Decree No 270 of the USSR Gosplan, dated 17 November 1983]

[Text] On the Procedure for the Confirmation, Apportionment and Reapportionment of Limits for the Consumption of Electric Power

Decree of the USSR Gosplan, Dated 17 November 1983, No 270

(Extract)

The State Planning Committee of the USSR decrees:

1. To confirm the subjoined Procedure for the Confirmation, Apportionment and Reapportionment of Limits for the Consumption of Electric Power.

2. To recognize as ineffective the Procedure for the Confirmation and Apportionment of Plans for the Consumption of Electric Power, confirmed by the USSR Gosplan and the USSR Ministry of Power and Electrification on 30 December 1980.

Procedure
for the Confirmation, Apportionment and Reapportionment of Limits for the Consumption of Electric Power

Confirmed by Decree of the USSR Gosplan, dated 17 November 1983, No 270

1. The present Procedure was developed in conformity with effective legislation.

2. The annual limits of the consumption of electric power for ministries, state committees, and departments of the USSR and the Councils of Ministers of the union republics are confirmed by the USSR Gosplan, proceeding from the

total volume of electric power production being planned for the coming year, the plan tasks for the output of production and types of work, the norms for the expenditure of electric power, and the tasks for its economy.

In the determination of the electric power requirement necessary for consumers for whom expenditure norms have not been established, the report of the USSR Central Statistical Administration as per form 9-ps (position on 1 August of the current year).

The limits for the consumption of electric power established for the ministries, state committees and departments of the USSR and the Councils of Ministers of the union republics include the receipt of electric power from the electric power plants of the USSR Ministry of Power and Electrification and the output of electric power by their own electric power plants (block stations).

3. The USSR Gosplan confirms the annual limits for the consumption of electric power for the ministries, state committees and departments of the USSR (in accordance with a list coordinated with the USSR Ministry of Power and Electrification) and for the Councils of Ministers of the union republic and communicates these limits to them prior to 1 November of the current year.

For organizations and institutions of ministries, state committees and departments of the USSR which are not included in the list (other consumers), a limit for electric power is not established.

The limits for the consumption of electric power subject to confirmation for the coming year are examined by the Department of Power and Electrification of the USSR Gosplan for ministries, state committees and departments of the USSR from 1 September to 5 October, and for the Councils of Ministers of the union republics--from 10 October to 20 October of the current year.

Disagreements arising in the process of the determination of the limits for the consumption of electric power are examined by the management of the USSR Gosplan in the course of September-October of the current year.

4. The limit for the consumption of electric power confirmed for the ministries, state committees and departments of the USSR include the consumption of power by all subordinated enterprises, associations, organizations and institutions, as well as by the enterprises and organizations of municipal and cultural and consumer designation, subsidiary farms, construction, transportation, and other organizations which are included in their balance-sheet.

The limit for the consumption of electric power confirmed for the Councils of Ministers of the union republics include the delivery of electric power to all consumers subordinated to the Councils of Ministers of the union republics (in accordance with a list coordinated with the USSR Gosplan and the USSR Ministry of Power and Electrification): Union-republic ministries, state committees and departments in the union republics, republic ministries, state committees and departments, Councils of Ministers of the autonomous republics, executive committees of kray, oblast, city (cities of republic subordination) Councils of People's Deputies, as well as sovkhozes, kolkhozes, inter-farm enterprises and

organizations, enterprises and organizations of municipal and cultural and consumer designation and other spheres of consumer services, state and public institutions and organizations.

The limit for the consumption of electric power being confirmed for the Councils of Ministers of the union republics include also the consumption of electric power of enterprises, associations, organizations and institutions located on the territory of the republic which are subordinated to the Councils of Ministers of other union republics.

Moreover, the magnitude of the consumption of electric power by the population is stipulated by a separate line in the limits for the consumption of electric power being confirmed by the Councils of Ministers of the union republics.

The magnitude of the consumption of electric power by the population includes electric power expended by the urban and rural population for household needs, as well as for private subsidiary farms, personal garden plots, and country cottages in private use, garages for private automobiles, for the needs of private studios of artists, sculptors, garage construction and housing construction cooperatives.

The delivery of electric power to the population living in apartment houses and dormitories included in the balance-sheet of enterprises, associations, organizations and institutions and which do not have a separate accounting of electricity expenditure with them, is not included in the magnitude of the consumption of electric power by the population.

5. The limit for the consumption of the electric power of enterprises, associations, organizations and institutions include losses in electric supply networks, as well as the consumption of electric power:

a) For production requirements (including for their own block-stations);

b) for the lighting, heating and ventilation of production and administration buildings;

c) by enterprises and organizations of municipal and cultural and consumer designation, subsidiary farms, construction, transportation and other organizations.

The consumption of electric power by enterprises, organizations and institutions that are secondary subscribers (subabonenty) is limited in accordance with their administrative subordination in the presence of separate accounting and the presentation, by the basic subscriber to the power system, of a detailed breakdown of the expenditure of electric power delivered to the secondary subscribers.

6. The delivery of electric power to enterprises, associations, organizations and institutions is made by energy supply systems in conformity with monthly limits for the consumption of electric power, taking into account changes made in accordance with established procedure.

7. The ministries, state committees and departments of the USSR, prior to 10 October of the current year, present,to the Department of Power and Electrification of the USSR Gosplan, the apportionment of the annual limit for the consumption of electric power by union republics (for the balancing of the plans of production and consumption of electric power).

8. The ministries, state committees and departments of the USSR, after confirmation of the limits for the consumption of electric power for the coming year, coordinate them (taking into account the plan for the output of electric power by the block-stations and its sale to the electricity supply system) before 15 November of the current year by regions and electricity supply systems, with a breakdown by quarters, with the Glavgosenergonadzor [Power Engineering Control State Inspectorate Main Administration] of the USSR Ministry of Power and Electrification.

The Councils of Ministers of the union republics (the state planning committees of the union republics),after confirmation, by the USSR Gosplan, of the limits for the consumption of electric power for the coming year, coordinate them (taking into account the plan for the output of electric power by the block-stations and its sale to the electricity supply system and consumption by the population) before 15 November of the current year by regions and electricity supply systems, with a breakdown by quarters, with the power engineering control state inspectorates of the ministries and main administrations of power and electrification of the union republics, which by the same deadline report about the coordination to the Power Engineering Control State Inspectorate Main Administration of the USSR Ministry of Power and Electrification.

The coordination of the apportionment of the limits for the consumption of electric power is effected with regard to the securing of the fulfillment of the plans for the output of production and types of work and the tasks with respect to the economy of electric power established for the ministries, state committees and departments of the USSR.

9. The ministries, state committees and departments of the USSR, after coordination with the Power Engineering Control State Inspectorate Main Administration of the USSR Ministry of Power and Electrification, report, before 20 November of the current year, the limits for the consumption of electric power for the coming year, with a breakdown by quarters, to administratively subordinated enterprises, associations, organizations and institutions, electricity supply systems, as well as to the USSR Gosplan, the USSR Central Statistical Administration, and the state planning committees of the union republics (with respect to the appropriate electricity supply systems).

10. The Councils of Ministers of the union republics (the state planning committees of the union republics), after coordination with the power engineering control state inspectorates of the ministries and main administrations of power and electrification of the union republics, report, before 20 November of the current year, the limits for the consumption of electric power (with apportionment of the magnitude of electric power consumption by the population) for the coming year, with a breakdown by quarters, to the union-republic ministries, state committees and departments in the union republics, to the republic ministries, state committees and departments, as well as to the enterprises,

associations, organizations and institutions administratively subordinated to them, to the Councils of Ministers of the autonomous republics, executive committees of the kray, oblast and city (cities of republic subordination) Councils of People's deputies, electricity supply systems, as well as to the USSR Gosplan and the USSR Central Statistical Administration.

The RSFSR Council of Ministers (RSFSR Gosplan), by the same deadlines, report the limits for the consumption of electric power, with a breakdown by quarters, to the Moscow Gorispolkom and the Leningrad Gorispolkom.

The Councils of Ministers of the autonomous republics and the executive committees of the kray, oblast and city (cities of union and republic subordination) Soviets of People's Deputies, no later than 1 December of the current year, apportion, by agreement with the electricity supply systems, annual (quarterly) limits for the consumption of electric power among the administratively subordinated consumers.

If wholesale consumers and resellers of electric power are present in the union republics, the limits for the consumption of electric power are established for the consumers and resellers on the basis of the entire range of consumers connected to their networks for the subsequent apportionment of the indicated limit for the enterprises, organizations and institutions, and for the implementation of control over the utilization of these limits.

The electricity supply systems of the USSR Ministry of Power and Electrification, on the basis of the limits for the consumption of electric power being established for the electricity supply system, determine and communicate to the consumers and resellers the summary limits (taking into account the losses of electric power, apportioned by a separate line, and its expenditure for their own and operational needs in the networks of the reseller) and secure control over the utilization of these limits.

11. The USSR Ministry of Power and Electrification, prior to 25 November of the current year, communicates to the electricity supply systems the limits for the consumption of electric power for the coming year, with a breakdown by quarters, by ministries, state committees and departments of the USSR and Councils of Ministers of the union republics, as well as the calculated requirement for electric power for the group "other consumers".

12. The ministries, state committees, departments and executive committees of the Councils of People's Deputies are responsible for the timely communication of the limits for the consumption of electric power to the administratively subordinated consumers.

13. The ministries, state committees and departments of the USSR and the Councils of Ministers of the union republics (state planning committees of the union republics), prior to 30 December of the current year, present calculations to the USSR Gosplan, with a breakdown by quarters (proceeding from the plans for the output of production and types of work, the norms for the expenditure of electric power and with regard to the assigned economy), which confirm the limits for the consumption of electric power agreed to with the Power

Engineering Control State Inspectorate of the USSR Ministry of Power and Electrification.

14. The ministries, state committees and departments of the USSR and the Councils of Ministers of the union republics may have an unapportioned reserve in the amount of up to 1.5 percent of the annual limit for consumption of electric power (with a breakdown by union republics and quarters) and use it with the consent of the USSR Ministry of Power and Electrification.

15. The USSR Ministry of Power and Electrification, no later than 10 December of the current year, presents for coordination to the USSR Gosplan the annual plans for the production of electric power for the electricity supply systems, with a breakdown by quarters, in coordination with the established limits for the consumption of electric power in due form according to the appendix* and, no later than 15 December of the current year, communicates these plans, coordinated with the USSR Gosplan, to the energy supply systems. The USSR Ministry of Power and Electrification, by the same deadlines, communicates the plans for the maximum electric power consumption to the electricity supply systems.

The plans for maximum electric power consumption of the electricity supply systems do not include the reserves of the ministries, state committees and departments of the USSR and the Councils of Ministers of the union republics, which is taken into account as whole for the USSR Ministry of Power and Electrification (with a breakdown by union republics and quarters).

16. The consumers, no later than a month prior to the beginning of a regular quarter, apportion the quarterly limits for the consumption of electric power in conformity with the volumes of production and types of work established for them, by agreement with the electricity supply systems.

In the case where the consumers of electric power do not present the apportionment of the limits for the consumption of electric power, with a breakdown by the months of the quarter, by the established deadline, the electricity supply systems effect the apportionment of the indicated limits in conformity with the number of calendar days in every month.

17. The ministries, state committees and departments of the USSR may one time during the last month of the current quarter, no later than 10 days before its completion, reapportion the limits for the consumption of electric power of the last month of the quarter among the administratively subordinated enterprises, associations, organizations and institutions:

--Within separate electricity supply systems--by agreement with the electricity supply systems;

--among regions and electricity supply systems--by agreement with the USSR Ministry of Power and Electrification, for the electricity supply systems of the UkSSR, the KaSSR, and the BSSR--by agreement correspondingly with the

*) The appendix is not cited in the BYULLETEN'.--Ed. Note.

UkSSR Ministry of Power and Electrification, the KaSSR Ministry of Power and Electrification, and the BSSR Main Production Administration of Power and Electrification.

The Councils of Ministers of the union republics (state planning committees of the union republics) may one time during the last month of the current quarter, no later than 10 days before its completion, reapportion the limits for the consumption of electric power of the last month of the quarter among the enterprises, associations, organizations and institutions, the Councils of Ministers of the autonomous republics, the executive committees of the kray, oblast, city (cities of republic subordination) Councils of People's Deputies:

--Within separate electricity supply systems--by agreement with the electricity supply systems;

--Among regions and electricity supply systems--by agreement with the USSR Ministry of Power and Electrification, for the energy supply systems of the UkSSR, the KaSSR, and the BSSR--by agreement correspondingly with the UkSSR Ministry of Power and Electrification, the KaSSR Ministry of Power and Electrification, and the BSSR Main Production Administration of Power and Electrification.

The Councils of Ministers of the autonomous republics and the executive committees of the kray, oblast and city (cities of republic subordination) Councils of People's Deputies may one time during the last month of the current quarter, no later than 10 days before its completion, reapportion, within the limits of individual electricity supply systems and by agreement with them, the limit for the consumption of electric power of the last month of the quarter among administratively subordinated consumers.

Changes of the limits for the consumption of electric power among regions and electricity supply systems are communicated by the ministries, state committees and departments of the USSR and the Councils of Ministers of the union republics (state planning committees of the union republics) to the administratively subordinated consumers, the Power Engineering Control State Inspectorate Main Administration of the USSR Ministry of Power and Electrification and the electricity supply systems, and by the ministries, state committees and departments of the USSR also to the state planning committees of the union republics (with respect to the corresponding electricity supply systems).

The reapportionment of limits for the consumption of electric power among quarters of the year is not effected (with the exception of the reserve envisaged in point 14 of the present Procedure).

18. The consumers, by agreement with the electricity supply systems, may twice in the course of the current quarter (in the first and second month no later than 10 days before their completion) reapportion the monthly limits for the consumption of electric power within the framework of the quarterly limit.

The indicated changes are brought about provided that appropriate substantiations are presented by the enterprises, associations, organizations and institutions (a change in the supply of raw material and fuel, the presence of emergency situations, the change of the number of working days due to production

reasons and other changes).

Changes of the limits for the consumption of electric power are communicated by the electricity supply systems to the USSR Ministry of Power and Electrification, and the consumers of electric power--on the basis of administrative subordination to the ministries, state committees, departments of the USSR, and the Councils of Ministers of the union republics (state planning committees of the union republics).

19. The USSR Ministry of Power and Electrification, in conformity with the effected changes and following established procedure, introduces corrections in the plans for the production of electric power and the maximum electric power consumption for the electricity supply systems.

20. Enterprises that have block-stations are allowed to utilize, for their own needs, all the electric power produced by the block-stations above the monthly plan for the production of electric power, provided that the established plan for the transmission of electric power to the electricity supply system and the delivery of electric power to other consumers connected to its [as published] networks is fulfilled.

In case of the nonfulfillment of the plan for the output of electric power by the block-stations, the USSR Gosplan, upon presentation of the USSR Ministry of Power and Electrification, examines the question of reducing the limits for the consumption of electric power by the appropriate ministries and departments of the USSR and the Councils of Ministers of the union republics.

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GENERAL

BRIEFS

USSR-POLAND POWER-LINE NEARS COMPLETION--Lvov--Collectives of Yugzapelektrosel'stroy [Southwestern Rural Power Construction] Trust's mechanized columns have another new construction job on their labor records. It is the powerful 750-kilovolt LEP [power transmission line], which is instrumental in increasing the supply of electric power to the Polish People's Republic. The high voltage line which started out from Khmelnitskiy Oblast cut across the area near Lvov and continued out toward the Soviet-Polish border. Tests have shown the quality of the installation to be high. When the substation near the city of Sheshuv, in the PNR, is put into operation, the line will be immediately operable. This LEP-750, the second in succession in the SEV [Council for Mutual Economic Aid] countries, is distinguished by the fact that a different structural design for the line supports was used in its construction. They weigh less, and are therefore more economical than those used previously. Having completed this new construction within the assigned deadlines, the mechanized columns are moving to the southern Ukraine, whence the third LEP-750 is already being laid. This major Soviet power-span is intended for Romania and Bulgaria. [By V. Bukovich, special IZVESTIYA correspondent] [Text] [Moscow IZVESTIYA in Russian 21 Oct 84 p 1] 12659

MARITIME OIL-SLICK COLLECTOR DISCUSSED--Rostov-na-Donu--Even one drop of oil which has fallen onto an aqueous surface is quickly dispersed and turns into an oily spot that's very difficult to catch and render harmless. But what is to be done when an oil slick which is meters, and even kilometers long, begins to shine on the sea? The Murmansk Steamship Company uses an oil collector which was designed by specialists of the Central Rostov Office of Planning and Design of the USSR Ministry of the Maritime Fleet. The device operates on the principle of a seine. It is dragged behind a vessel and very gently captures oil which has escaped into the sea. The oil trap, as the specialists and operators have confirmed, can operate at speeds of up to two knots , and even in a storm of wind-force four. The petroleum products which are collected go into a special accumulator, where they undergo separation and can be used again. [By G. Gubanov, IZVESTIYA personal correspondent] [Text] [Moscow IZVESTIYA in Russian 27 Oct 84 p 2] 12659

INDUSTRY, SCIENCE DISPLAY WARES--(UzTAG)--"From Scientific and Technical Department to Scientific and Technical Progress" is the name of the new exposition which opened 10 October at the UzSSR VDNKh [Exhibit of Achievements of the National Economy]. One of the exhibits was a model of a four-stand

rolling-mill used for rolling pipe and wire. It has been introduced in a collective of the Uzbek Refractory and Heat-Resistant Metals Combine. The economic effect realized from using this innovation has exceeded 150 thousand rubles. Nearby there was a coupling used in the two-stage pressure grouting of casing strings, and which was proposed by specialists of the Uzbekneftegaz-geologiya [Uzbek Oil and Gas Geology] Association. It has been introduced into operation at 60 wells and has effected a saving of 280 thousand rubles. [Excerpt] [Tashkent PRAVDA VOSTOKA in Russian 12 Oct 84 p2] 12659

NEW OIL, GAS INDUSTRY MINISTERS--The Presidium of the USSR Supreme Soviet has appointed Vasiliy Aleksandrovick Dinkov minister of the USSR oil industry, relieving him of his duties as minister of the USSR gas industry. Nikolay Alekseyevich Maltsev is relieved of his duties as minister of the USSR oil industry in connection with his retirement on pension. Viktor Stepanovich Chernomyrdin has been appointed minister of the USSR gas industry. [From the "Vremya" newscast] [Text] [Moscow Television Service in Russian 1800 GMT 12 Feb 85 LD]

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